RAILROAD GAZETTE

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Contributions.

Compound Locomotives on the Continent.

Geneva, Switzerland, Aug. 31.

To the Editor of the Railroad Gazette:

It may interest you to know that four-cylinder compound locomotives (general pattern of "Nord" engines) are steadily making their way in this country. I see the North Eastern, the Central and the Jura-Simplon are trying them; the Gothard have of course been using them for some time. A few have also been made in England, but, I am sorry to say, in almost every respect inferior to the French model.

The latest thing in Russia is the tandem compound (i. e., Woolf) engine, a pattern only a very little better than the —— as regards track wrecking, and in every way worse than the Nord engine. Russian railroad men, in fact, apparently have no more than a superficial idea of what contributes suitability in an engine. They usually simply copy the latest Paris or more often German fashion. A few years ago Joy's valve motion was quite the thing; now it is the Waelschaert (an older motion, by the way). Having been within the circle, I know pretty clearly how such questions are determined there. A. B.

Gain or Increase?

Baltimore and Ohio Railroad,
Baltimore, Sept. 12, 1898.

To the Editor of the Railroad Gazette:

Noting that grammatically we square each other, perhaps you will give me room to add that the idea at the back of my note of 3d inst. was not one of mere grammar, but essentially that a journal of the standing and objects of the Railroad Gazette should not encourage the confusion that exists in railroad nomenclature.

Regarding this confusion: Is there any agreement, for example, as to what net earnings are, or profit, or surplus? Happily, there is an increasing tendency to establish standards in all departments of railroads, while the observant well-wisher of the owners of railroads cannot have failed to notice with satisfaction a growing inclination to call things by their right names.

This state of affairs should be very welcome to professors of an exact science like civil engineering, wherein three cannot be dealt with as four, nor black made to appear white. Therefore, sir, if in your own profession you have to use exact terms, why, when you turn to your financial side, should you be less precise? Are you not lowering your own standard?

This was my idea; nothing more. Grammar doesn't count on railroads. M. B. WILD.

The British Summer Train Service.

London, Aug. 24, 1898.

To the Editor of the Railroad Gazette:

The improvements in the summer train services are not on the whole much to boast of. In some cases speed has actually been reduced. There is, however, one brilliant exception. For many years the North Western trains to Holyhead for Ireland were a blot on the otherwise excellent service of that great company. The last few months have seen—some people may think that the projected competition of the Great Western via Rosslare has something to do with the matter—a remarkable improvement. For years the best train between Euston and Holyhead (264¾ miles) took about 6½ hours. There are now four down trains, the slowest taking 5 hours 35 minutes and the fastest 5 hours 15 minutes. On the other hand, a historic train, the 10 o'clock to Scotland, the lineal ancestor of the "Empire State" and the "'Black Diamond" expresses, has been practically decelerated. For, though it reaches its destination at the same time as before, restaurant cars have been attached, the 20 minutes' stop at Preston for refreshments has consequently been cut out, and the time saved allowed for slower running—one more proof that the increase in power of our locomotives has not kept pace with the increase in the weight of trains.

Another feature in the summer services is the great increase in the number and length of runs of 100 miles and upwards without a stop. A table has been published giving a list of no less than 89 which are performed daily, as against 58 this time last year. At their head is the Great Western run between London and Exeter (194 miles), which was in practice done for some weeks last summer in one direction, but now appears in the regular time tables and is done both ways. The Great Western also runs for the first time between London and Birmingham without a stop, 129 miles in 147 minutes.

It is also interesting to note what I may call greater flexibility in the construction of time tables. A few years back one could have named a good many stations at which every train called as a matter of course. The North Western began to disestablish Rugby some time ago. This year Crewe and Chester share the same fate, while through Preston, with its 100,000 inhabitants, more than a dozen expresses a day run without stopping. The Midland runs round Sheffield and Leeds, two towns with a population of 400,000 apiece. Bristol, to which the Great Western now gives the go by, has over 200,000 inhabitants. So too, the Great Northern runs direct from Peterborough to York, 112 miles; while the Great Eastern carries its passengers from London through Ipswich and Norwich, the two largest towns on its system, without a stop, in order to land them by the seaside at the village of North Walsham.

W. M. ACWORTH.

Death of Judge Cooley.

Hon. Thomas M. Cooley, the first chairman of the Interstate Commerce Commission, died at his home in Ann Arbor, Mich., on Sept. 12 at the age of 75. Judge Cooley had been in very feeble health for over a year. His mind and body both failed, and he had been for a long time staying at a private sanitarium at Flint, though for the past three months he had been at home, apparently somewhat improved.

Judge Cooley had had a long and somewhat varied career, but he will be remembered by railroad men chiefly for his work on the Interstate Commerce Commission. President Cleveland called many good men to the public service, but none who better fulfilled his mission than Judge Cooley. In view of the moderate salary and the undefined nature of the work which the Commission was expected to undertake the acceptance of the place was a personal sacrifice; but Judge Cooley's devotion to the public interest was of the highest and purest character, and he cheerfully undertook the difficult leadership of a semi-judicial body which was expected by a large part of the public to achieve the impossible task of formulating a simple and compact body of law to govern the very complicated transportation interests of this great and growing country, with its constantly changing conditions. No man could have administered the Interstate Commerce law so as to do justice, or to satisfy the people, for the law was (and is) inconsistent in itself; it attempts to regulate commercial forces which legislation is powerless to control, and its penalty clauses were crude and untried; but Judge Cooley steered the Commission in the most feasible channel possible; he kept the landmarks of settled law and of justice constantly before the public, and in a masterly way defined the Federal law of transportation as far as it could be defined. He wore himself out in the work, and had to give up from sheer exhaustion after trying for four years to clarify the confused views of grangers concerning the railroads and of the railroads concerning the public. Toward the close of his career he was perhaps a little too lenient toward the farmer, who, misled by unsound theories, believed himself oppressed by the transportation interests, but never for a moment did Judge Cooley consciously deviate a hair's breadth from the loftiest justice.

Judge Cooley was born at Attica, N. Y. He began the study of law in 1842, removed to Michigan in 1843 and was admitted to the bar in Adrian in 1846. He practiced his profession a few years, was an editor of a local newspaper, and in 1857 compiled the General Statutes of Michigan. Next he was reporter of the Supreme Court of that State for seven years, during which time he published eight volumes of reports and made a digest. In 1859 he became a professor in the Law Department of the University of Michigan and was subsequently Dean of the Faculty, which place he held for many years. He was one of the Justices of the State Supreme Court for twenty-one years, being Chief Justice in 1868 and 1869. He retired from the bench in 1885, and after that delivered lectures in Johns Hopkins University, besides continuing various duties at the University of Michigan. His appointment in 1882 with Judge Thurman and Mr. E. B. Washburn, as arbitrator of the railroad dispute on the question of differential rates, directed his attention in later years toward railroad problems.

In 1886 the United States Circuit Court at Chicago appointed Judge Cooley one of the receivers of the Wabash Railroad, but he held that office only a short time before President Cleveland called him to the Interstate Commerce Commission. He was chosen by his associates chairman of the Commission, and held the office for four years, when his health gave way. Since then he had held no public office. Identified throughout his active life with the Republican party, he was yet never a partisan in politics, and the essential impartiality of his mind toward all public questions gave great weight to his words among all classes.

Judge Cooley published many books on legal subjects, including constitutional law, law of taxation and a series of state histories. He furnished nearly all the legal articles in Appleton's American Cyclopædia (1876), and it is probably fair to say that he will take rank among the leading writers of the world on constitutional law. The degree of Doctor of Laws was conferred upon him by the University of Michigan and by Harvard University.

Judge Cooley's private life was as calm and delightful as his public life was exalted and useful. He was simple and gentle, and a warm-hearted and faithful friend.

The Roadmasters' Association.

The annual convention of the Roadmasters' Association of America began at Denver on the 13th. We have no report of the proceedings, but give below abstracts of such of the committee reports as have reached us.

Best Method of Preventing Creeping Rails.

Rails creep in the direction of the traffic on double track lines. This creep is found to be greater on down than on up grades, and is found in its worst form where tracks have been laid over marshes or soft, yielding sub-soil. It has also been ascertained that on curves the outer or high rails creep the more, and where there are successive reverse curves, and especially on grades, the creep starts on tangent at approach, continues on high rail to the end of first curve, then the opposite high rail on reverse curve shows the more creep. In other words, the high rail on each successive curve is found to creep more than the low rail. This state of affairs was noted on a stretch of five miles of track which was composed of 4 to 6° reverse curves. It was also noted that on straight lines on double track the rail on the outer edge of embankment crept more than the inner rail, because of less support.

The cause of creeping track is because of a rolling load passing over it, which depresses the track directly under it and produces a corresponding elevation and depression ahead and behind it, which may be likened to a wave motion.

As the rails shove ahead they drag the ties with them, the only resistance being the amount and kind of ballast between them. If the track is well filled in the center, but bare at the ends of the ties, another lever movement is introduced. The ballast in the center acts as a fulcrum, the tie becomes the lever, and instead of moving ahead with the rail and retaining its corresponding position at right angles with it the one end is forced ahead of the other; especially is this the case with joint ties, and more particularly where rail is laid with broken joint, with the added result of tightening the gage. Aside from this, the ties are moved off their well-tamped foundation on to the softer untamped bed between the ties, and, if not closely watched and early corrected, the whole track will creep the more, because of the looseness of the several parts, and then a general disintegration takes place, which will require several hard seasons' work to restore, the only means being either to draw the rail back and straighten up the ties, or else replace all of the ties to suit the new location of the rail. To do this requires as much, if not more, work than to make the tie renewals and surface the track.

It is doubtful if a remedy for creeping rails exists or can be found, and we are none too sure that if stopped it would be only to reappear in another form. While it cannot be eliminated entirely, it is quite possible to restrict it so that in its effect it is not so destructive. The most common method is to rely upon anchorage at the joint by spiking the tie through slots in the angle bars. The value of this style of anchorage depends upon the number of ties over which the angle bar extends, which may be one, two or three, and resistance is directly in proportion to the number of ties. In practice it is found that the three-tie joint affords the best anchorage, but it does not entirely prevent the rails from creeping. It is also found that by placing a dummy joint in the center of the rail opposite the joint, which may be made from old angle bars and bolted to the rail and spiked to the slot, additional anchorage is afforded.

On some roads specially designed dummy joints are made in clip form; these clips fit in the web of rail the same as an angle bar, but in addition extend under the base of rail like a lip chair, slotted on the inside and punched on the outside of rail for spikes, taking the place of a tie plate, as well as affording anchorage. Either of these forms give fair results.

As creeping is the result of wave motion, the best remedy which suggests itself is to restrict that wave motion to a minimum, which can only be done by having a rail stiff in section to transmit the weight of the load over the greatest possible area of ties and ballast, to be well tied, with spikes kept snug to base of rail, and ballast dressed off as full as can be at the end of ties and at the same time allow for drainage.

It is the trackman's constant aim to restrict all movements of track, and as he approaches the ideal in this direction only will he be able to in a measure prevent creeping rails.

H. W. Church, Samuel Greer and John Redington, Committee.

Latest Improvements in Frogs and Switches.

Your committee finds that there has been but little that may be considered new, and yet has had sufficient use to prove its value, introduced since the report of last year on this same subject. The spring rail frog and split switch continue in general use for main track work, and are constructed on general lines which are very familiar. Special attention has been paid during the last year by designers and manufacturers to improving in detail the separate parts of these devices, in order to make a safer and more serviceable whole.

Frogs.

With spring frogs, the following details are carefully looked after:

(1) Anchor of spring rail or anti-traveling device. On plate frogs this is accomplished by a link attached to a pivot on the plate and one on the movable rail. On frogs without bottom plates the spring rail is secured by means of an anchor block at the joint at the toe of frog bolted to both the fixed and movable wing rails of frog, or the spring rail is attached to plates fastened to under side of frog and spiked down to the ties. The spring rail should be so secured that the maximum amount of travel possible will not cause the spring rail to bind in either opening or closing.

(2) Holding down devices. These prevent vertical motion of spring rail, and generally consist of pockets inclosing a lug, which is fastened to the movable rail. These lugs are allowed a vertical play of not to exceed ¼ in. and sufficient longitudinal play to prevent binding.

(3) Grooving of movable rail. The groove is parallel to gage line of main track side of frog, the outer line of the groove being 4¼ in. from the gage line and inner line distant from gage by width of head of rail.

(4) Springs. The size and number of springs to each frog vary, as does also the location of the springs with reference to point of frog. The power of the spring should be ample to close the spring rail under all ordinary conditions, and should be placed as near as practicable to the center of that portion of the wing rail which fits up against the frog point. If a spring bolt is used, it should be of the best quality iron.

(5) Stops. Spring frogs should be provided with stops which will absolutely prevent the spring rail from opening to any greater extent than the standard width of throat in a rigid frog.

(6) Heel Riser. Spring frogs, as well as all other main track frogs, should be provided with a heel riser of steel rail run back far enough so that combined width of riser and head of point rail will at least equal the width of tread of engine driver.

Rigid frogs, as their name implies, should be as substantial as possible. If of the filled, bolted pattern, the bolts should be 1 in. in diameter for rail from 4¼ in. to 5 in., and 1⅛ in. in diameter for rails more than 5 in. in height. If plate frogs, the bottom plate should be not less than ¾ in. thick, and the rails secured to it with ¾ in. rivets having a pitch of not more than 3 in.

Switches.

The split switch is in general use throughout the country. One of the features that has been discussed largely of late years is the number of tie bars, and uniformity of practice in this respect has not yet been attained. While some lines show a tendency to increase, rather than diminish, the number of tie bars, your committee is of the opinion that with split switches 15 ft. long, properly re-enforced and provided with stop lug, two adjustable tie bars are all that are necessary. The use of a wrought iron plate extending through under both rails at the point of switch, with the ends fitted with rail braces, is an improvement that is becoming more general.

Slide plates should extend under the main rail and be heavy enough to keep from bending, and should be fitted with a rail brace on the outside. Bolts and pins in connecting rods and tie bars, except those fastening lugs to split rail, should be turned to exact size, be a neat fit, provided with nut and spring cotter, and, as far as possible, be of uniform size throughout the switch. We believe that the general practice is to make these bolts too small.

C. Dougherty, S. P. Adams, Peter Clark, Thos. McKune and E. H. Bryant, Committee.

Long Rails and Miter-Cut Ends.

Rails of 45 and 60 ft. in length have been in use on a few railroads in this country, mostly in an experimental way, for the last six to eight years. The only advantage which seems to have been developed during this time by their use is in the reduction of the number of joints. Some of their objectionable features are as follows, namely:

First: Rail mills do not as yet appear to be able to turn out as straight a rail of 45 or 60 ft. in length as those of 30 ft.

Second: Their contraction makes them more liable to flatten on the ends than rails of shorter lengths, and their greater tendency to creep makes it necessary to put on stops, which increases the expense, and does not entirely prevent the creeping.

Third: Forty-five or sixty foot rails are not as readily or as economically transported or handled when new, or when taken out for relaying or for shipment when worn out, as those of 30 ft.

Miter-cut rails have been to some extent tried from remote periods, and somewhat extensively so on some few lines within the last ten years or so, and the experience with them after this length of time has not been satisfactory and has been temporarily, if not permanently, abandoned. The principal reasons for this are that they break at the ends where the head and web join, caused generally by the extension of one side of the head beyond the other, and the angle at which they have to be cut thus far shows that there is very little or no difference in the blow received from passing wheels from those having square ends; and further, the flow of metal at the ends appears to be greater with the miter than square-cut rails.

We do not deem it advisable to recommend that there is enough advantage in increasing the length of rails beyond 30 ft. or to use rails with miter-cut ends to recommend their use.

R. Caffrey, Chairman.

Discipline, in Its Practical Application to the Track Force.

Discipline is primarily educational, with the object of increasing the efficiency of the employee and at the same time preserving the esprit de corps. There are two distinct methods of the application of discipline, the one which educates by regulations and special instructions, where the breach is regarded as an offence to be corrected by punishment which takes the form of reprimand, suspension or dismissal; the other, known as the "Brown" system, which has been adopted by 28 per cent. of the 180,000 miles of railroad in the United States. In this latter system the educational feature predominates, the idea of punishment being entirely eliminated. Under it the employee is not subjected to fines and suspensions, but is judged wholly by his record, and is retained or dismissed accordingly as his record is good or bad.

Abolishing from our minds the idea that discipline means punishment, but is purely educational, and bearing in mind that the success of any undertaking depends largely upon the skill of those engaged in it, the query naturally arises as to which of these two systems is the better, as applied to track forces.

In the event of a suspension under the first-named system it is necessary to put a substitute in charge, who, as a rule, is less skillful, lacks knowledge of the localities and conditions, and where suspension is for a considerable length of time the company would suffer because of this lack of skill and knowledge. The suspended employee would not only lose his time, with the consequent hardship entailed upon his family, but it causes him to feel a secret dislike for his superior and the company he serves.

As Herbert Spencer says in Education, "He who suffers nothing more than the evil which obviously follows naturally from his own misbehavior, is much less likely to think himself wrongly treated than if he suffers an evil artificially inflicted on him. Penalties which the necessary reaction of things brings around him; penalties which are inflicted by an impersonal agency, produce an irritation that is comparatively slight and transient; whereas penalties which are voluntarily inflicted (by a superior) and afterward remembered as caused by him, produce an irritation both greater and more continued."

With the "Brown" system, instead of the employee losing his time and his family being inconvenienced, if not immediately suffering by reason of his enforced idleness, a given number of demerit marks would be entered against his record. The company would be the gainer by his retention in the service, not having to educate a new man, with the possibility ever present of his making a still greater mistake. The retained employee would feel his error more keenly and would, I think, be less likely to err in the future, and so far as the others are concerned, the lesson would be equally as good. Educated in the school of experience, men learn that like causes produce like effects. From the better understanding of mature years the stern discipline of nature is not required nor is it applicable. As John Locke long since remarked in speaking of the education of children, "Great severity of punishment does but very little good—nay, great harm; and I believe that those who have been the most chastised seldom make the best men." This will apply with equal force to men.

Be content therefore, with moderate measures and moderate results; advancement is made only by slow degrees and not in one jump. Have your men feel that you are their friend rather than their natural enemy; that your interests are mutual, and that their acts reflect credit or discredit upon you. "Above all, bear in mind the truth that the aim of discipline should be to produce a self-governing being; not to produce a being to be governed by others."

H. W. Church, Committee.

Minority Report on Long Rails and Miter Joints.

The use of rails of more than 30 ft. in length can be said to have passed the experimental stage, and the utility and economy in the use of rails 60 ft. long have been recognized by several important lines.

The first question that suggests itself naturally concerns the quality and texture of the metal as affected by rolling ingots sufficiently large to produce a rail 60 ft. in length. In a paper read before the Western Railway Club, Mr. F. A. Delano gave data concerning tests made in 1893 of samples taken from five 30-ft. 75-lb. rails rolled from a single ingot. In each of these tests the rail from the top of the ingot, being the first rail rolled, showed the lowest percentage of excellency, owing to the segregation of impurities in the top part of the ingot. This would probably be apparent in every ingot, whether of 1,000 lbs., 2,000 lbs., or 5,000 lbs. weight, and would seem to indicate the advisability of handling large ingots. At least one mill which I have visited rolls rails up to 180 ft. in length, afterward sawing them into 30 ft. lengths.

The transporting of rails up to 60 ft. in length is no longer a difficult or unusual problem, so we proceed to the consideration of the cost of handling 60-ft. rails as compared with the same weight of 30-ft. rails. Through the kindness of an official connected with one of the largest Eastern lines, and one that maintains a high standard of track, we are enabled to give the result of their experience with long rails, some 60 miles of which have been laid up to present time.

This road commenced laying 60-ft. rails, experimentally, in 1894, and the result thus far has been so satisfactory that large orders have been placed for rails of the same length for further renewals. The advantages gained are, economy in handling, reduced cost of maintenance and better riding track. On level or moderate grades, stop blocks are not found necessary and are not used. On heavy grades and on unstable marsh grounds one to two stop blocks or anti-creeping devices are used on each rail. Cost of this appliance is 13 cents and cost of putting it on is about 10 cents each. The unloading of the rails on this line is done in a very simple manner and with a less number of men than is necessary to handle 30 ft. rails from cars in the usual way. A rope about 30 ft. in length is supplied with a hook at one end to anchor to the track, and at the other to hook through the bolt hole at end of a rail on the car. The hooks being in place the work train is started and the rail drawn nearly off. Eight men with rail tongs then lower the end of the rail as the car is pulled from under it, and two men with bars throw the rail out of the track. In laying the rails in track, double the number of tongsmen and half the number of bolters are required that would be needed in laying 30-ft. rails.

The creeping of long rails has not been found the serious matter that had been anticipated. In summing up, the official assured us that "rails 60 ft. long can be handled as a whole more economically than rails 30 ft. long."

On account of varying conditions, difference in wages, etc., the actual cost per ton of handling rails on one division or one road would be unreliable and misleading in making comparisons with other divisions or other roads, so comparisons are made by percentages of cost on same road and divisions and under like conditions. On this basis the average saving on the road in question is fully 15 per cent. in handling and laying 60-ft. rails, over the same number of tons of 30-ft. rails.

Through the courtesy of Mr. M. J. Caples, Assistant Engineer of the Norfolk & Western Railroad, we have information as follows as to results obtained from the use of 60-ft. rails on that line.

They have 18 miles laid in winter of 1892-3, and 29 miles laid in 1894-5. To draw intelligent conclusions it will be well to take into consideration the conditions under which this rail was laid and the traffic over the line. The rail is 85 lbs. per yard, 5 in. high, and laid on grades ranging from .9 per cent. to 2.4 per cent. (47 ft. to 126 ft. per mile), and on curves as high as 16° with about 40 per cent. of all the curvature over 8°, single track. Traffic over this piece of track averages four passenger trains and 40 freight trains per day. Passenger engines, 10-wheel, with 98,000 lbs. on three pairs of drivers, and consolidation freight engines with 106,800 lbs. on the drivers. Ballast nearly all furnace slag. Joint fastening, "Churchill" patent 23-in. angle bar, extending 3¼ in. below base of rail, between the joint ties, and a ⅞ in. plate of the same length as the angle bar. No stop-block or anti-creeping device is used.

After 5½ years' service under these conditions, Mr. Caples says of the 18 miles laid in 1892-3: "We have had no trouble whatever by reason of expansion from any of the 60-ft. rails. The ends have not been battered sufficiently to enable us to determine that it is greater than 30-ft. rails laid at the same time where the normal expansion distance has been preserved. There has been no greater tendency on the part of 60-ft. rails to creep than with 30-ft. rails."

He adds that, in his opinion, a stop-block would be beneficial, and the battering of the ends consequent on creeping and expansion will make necessary the changing out during the present season of 130 rails (4 per cent.) of the 18 miles laid in 1892-3.

The cost of unloading and laying in track has been 20 per cent. less than unloading and laying an equal number of tons of 30-ft. rails under the same conditions.

After carefully considering all the information obtainable, your committee is of the opinion that the increase of the length of rails to 60 ft. is entirely practicable and that the benefits to be derived are, a reduction of the cost of handling and laying in track, a reduction of 50 per cent. in the cost of joint fastenings, if no stop-blocks are used, and of at least 25 per cent. if such a device is used, a reduction in cost of maintenance and better riding track.

The use of rails with miter ends may be said to be still an experiment, and trials that have been made on several roads have been disappointing in some re-

spects. It is certain that the principle is sound, that a diagonal opening between the rails, so adjusted that the tread of the wheel before leaving one rail engages the next, will relieve the joint from the blow incident to passing of wheels from one rail to another over square cut ends.

In 1894-5 a trunk line road laid three-quarters of a mile of 75-lb. 60-ft. mitered rails. These rails were cut at an angle of 45° and laid in single track, thus the points were facing on one side and trailing on the other. Joint fastenings, 34-in. angle bars, suspended joints. After 3½ years' hard service the joints are in excellent condition and the rails show no signs of wearing or battering at the ends. The officials who are interested and are watching this piece of track, feel hopeful that the mitered 60-ft. rail is the coming rail.

In 1894-5 the Norfolk & Western Railway laid in single track 29 miles of 85-lb. 60-ft. mitered rails, cut at an angle of 45°. Joint fastenings, "Churchill" patent, a 23-in. angle bar, extending 3¼ in. below the rail, between the two joint ties, combined with a $\frac{7}{16}$ in. base plate of same length as the angle bar. Traffic over this part of the line is four passenger trains and 40 freight trains per day, as detailed in that part of this report referring especially to 60-ft. rails. During the 3½ years' service three or four mitered points on 29 miles of track have broken off. No trouble with wheels catching the points. The mitered rails on this road are not giving good satisfaction, as under the heavy traffic the joints are battering badly, and it is estimated that the rails will give not more than two-thirds the service of square cut rails under the same conditions.

In April, 1893, 16 miles of 75-lb. 4¾-in. mitered rail, cut at an angle of 55°, were laid trailing points on double track on the C., M. & St. P. Ry.; joint fastening, 30-in. angle bar, with six bolts, suspended joint. Traffic over it has averaged about 10 passenger trains and 10 freight trains per day. Passenger engines are 8 and 10-wheel, with 60,000 lbs. and upward on three pairs of drivers; freight engines, standard and compound, with 84,800 lbs. on three pairs of drivers. By reason of crude or careless work in the mechanical part of the rail mill process, the rails were in bad surface when laid. One end of a large percentage of the rails was bent or dipped $\frac{1}{64}$ to $\frac{1}{16}$ of an inch, apparantly by having been thrust against a dog at the rail saw while hot, the ends not having been sawed simultaneously. The result was that in track, the mitered point being bent downward, the weight was thrown on the point and some sixty rails in the 16 miles of track had 3 in. of the mitered points broken off. Aside from this defect the mitered rails make good riding track, and after five years and four months of hard service show no signs of flattening or flowing at the joint; however, it can be said that neither does square cut rail laid at the same time and under the same conditions.

Good surface at joints is more easily maintained on mitered than on square cut rails. There has never been an instance of rail points slipping by or overlapping so as to form a lip.

The majority report of this Committee shows unsatisfactory results obtained on the Lehigh Valley road from mitered rails that have been in service about the same length of time as that on the C., M. & St. P. road. This rail was cut at an angle of 55° and laid with 30-in. angle bars, suspended joints.

In all the tests of mitered rails that have come under our observation the rails have been laid without a tie under the joint, and, with the exception of the N. & W. Ry., with no support for the base of the rail at the joint. Although the mitered rails, concerning which we have information, have not been in track long enough to fully develop the strong and weak points, from data obtainable your committee is of the opinion that much better results can be obtained by cutting the rails at an angle of 65° and using a tie under the joint, or a joint fastening that will give full support to the base of the rail. At an angle of 65° it is certainly not necessary to restrict the use of mitered rails to trailing points. No instance has come under our observation of any trouble with the rails cut at an angle of even 45°.

Gurdon W. Merrell, of the Committee.

New Motor Truck for the Lake Street Elevated, Chicago.

Mr. Frank Hedley, General Superintendent of the Lake Street Elevated, Chicago, has designed a new steel truck especially for use with the large motors which are about to be applied to the cars of that road.

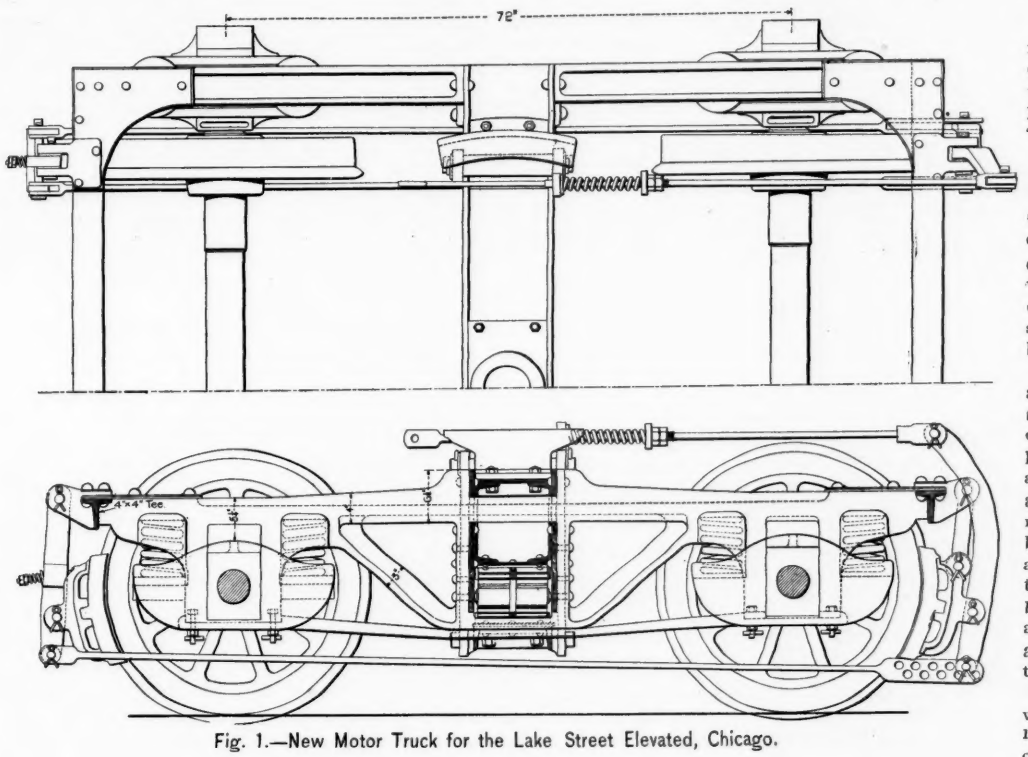


Fig. 1.—New Motor Truck for the Lake Street Elevated, Chicago.

One truck of this pattern was built some months ago for trial by the Siemens & Halske Co., and has since been in regular service. The idea was to make a truck which was simple in construction, and that could be readily inspected, having few parts and a large, clear space for the motors. We are told by Mr. Hedley that the arangement shown by the accompanying drawings, has been found to answer these requirements.

It will be seen that the side frames are of cast steel, the columns, pedestal jaws and upper spring seats being cast solid with the frames. The principal lines of the truck are those of the diamond frame; what corresponds to the upper member is an I section, the lower member a ⊥ section, while a flat steel bar is used for the tie. The cross bars at the ends of the frame are 4 in. x 4 in. tees bent downward near the middle so as to clear the draft rigging, which on the Lake Street Elevated cars is quite low.

The transom is formed of two ⅝ in. steel plates, riveted to the side frames, between which is a swing bolster 10 in. wide, made of two 10 in. steel channels, with top and bottom cover plates. The bolster rests on elliptic springs at either end, which in turn are carried by the spring plank made of a 10 in. steel channel; the links are 24 in. long. In addition to the elliptic springs under the bolster, coil springs are placed one on either side of the pedestal, so that a very flexible spring arrangement is secured.

The wheels are 33 in. in diameter, and the wheel base is 72 in. It will be seen that a large space is available for the motors, two of which are used, of the G. E. 55 type, each of 175 h. p. The motor casing clears the ties by 3 in. Each motor car on the Lake Street Elevated has but one driving truck, which carries a weight of about 28,000 lbs.

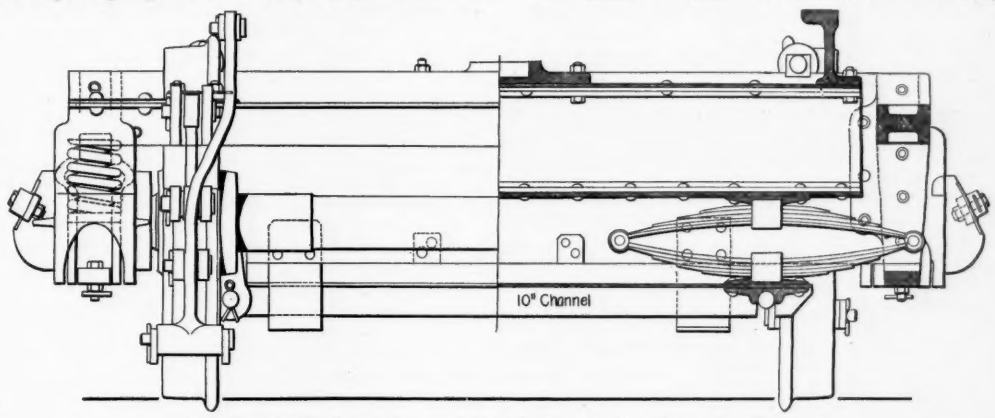


Fig. 2.—Half End Elevation and Half Section, Hedley Motor Car Truck.

To facilitate inspection and repairs to the motors no brake beams are used, but the brakeshoes are suspended by links, and the brake rigging on one side is independent of that on the other. The brakes are outside-hung for the reason that the fine dust from the brakeshoes with inside-hung brakes has been found to injure the gears and bearings of the motors.

We are informed that this truck will shortly be placed on the market, and that a truck of similar design will probably be brought out for use under the passenger cars of steam railroads.

Traveling Engineers' Association.

The sixth annual meeting of the Traveling Engineers' Association began Tuesday, Sept. 13, at the Genesee House, Buffalo. Abstracts of those reports which were received up to the time of going to press follow:

"What Is the Best Method to Be Pursued by Traveling Engineers in Giving Air Brake Instruction While on the Road?"

The committee consisted of Messrs. C. B. Conger, T. A. Hedendahl, C. P. Lovell, H. C. Frazer and George C. Parker. This is an excellent report, and covers the principal details of air brake instruction which should receive the attention of the traveling engineer while on the road, together with much sound advice about handling trains fitted with air brakes.

The traveling engineer should first learn to make smooth, sure stops at any point on the road, so as to be able to successfully illustrate any point to the enginemen. The men should be instructed particularly not to slow down the train and then drag into a station, and how to release just before coming to a full stop, so as to avoid the lurch. The proper method should be explained for coupling the air brakes of engines and cars and testing the brakes, also how to detect a partially closed angle cock by the sound of the train pipe exhaust, the causes for brakes sticking and how to care for the brakes and air pump on the road. The trainmen, as well as the enginemen, should be given instruction, so that both will work together.

In the matter of operating trains partially equipped with air brakes, where both are used together, the report states that "the hand brakes should be set on the cars immediately behind the air brake cars, as that is the place where the slack in the train can be most easily taken care of, whether air or hand brakes are set or released." This does not agree with the practice of the Chicago, Rock Island & Pacific, which road requires that the slack in such trains be controlled from the rear by the hand brakes alone. The report goes into considerable detail as to those parts of the air brake equipment which should be particularly brought to the notice of the men. Instructions or comments should not be made while the enginemen are engaged in such operations as require their entire attention, and the object should always be to get the men interested, so as to think for themselves. Should an accident or delay occur through some one's carelessness or ignorance, it should be made an object lesson for the rest. All explanations should be made as clear and with as few words as possible, and without using technical terms. All those who have to do with the instruction of enginemen and trainmen in air brake matters, should secure a copy of this report.

"How Can the Traveling Engineer Best Instruct and Assist the Fireman in the Economical Firing of the Locomotive?"

The committee consisted of Messrs. M. W. Burke, G. O. Taylorson, P. A. Eich, C. F. Keith and A. Sinclair.

It is recommended that the traveling engineer first familiarize himself with the different kinds of coal used on the road, and how each can best be burned on the various classes of engines, so as to be prepared to intelligently give instruction. Attention is called to the practice of the transportation department in making it an object of the first importance to get over the road and arrive at the terminal on time, which has to be taken into consideration when it is desired to save fuel. The engineman should be

made to feel that he is responsible for the fuel burned, and that he is expected to instruct the fireman. The fireman should read some elementary treatise on combustion, and the action of some large roads in furnishing literature on this subject is commended. It is considered best for the traveling engineer to ride with a new fireman on the first few trips, and afterward at frequent intervals until he thoroughly understands his duties. Much fuel is thought to be wasted by the improper adjustment of the draft appliances, and it is suggested that this be given more attention.

"Lubrication of Locomotives."

The committee consisted of Messrs. P. H. Stack, C. A. Crane, D. Meadows, J. F. Walsh and W. E. Symons. This report is based upon the answers received to a circular letter addressed to the members, a large number of answers being received. The subject is considered under three heads: First, the proper fit of bearings; second, the quantity of lubricant needed; third, the manner of applying the lubricant to the bearings.

Under the first head attention is called to the importance of having all bearings fitted properly and all answers indicated that better results are obtained by burnishing crank pins and axle journals with a roller.

As to the quantity of oil needed, 75 per cent. of the answers state that the engine should be oiled at least every 40 or 50 miles, but the committee states that under average conditions a locomotive should run not less than 100 miles with one oiling.

Under the third heading the committee states that oiling of engine trucks, driving boxes and shoes, wedges and valve gear, should be done as short a time before leaving a terminal as possible. Much depends upon the care taken in packing the engine truck boxes, and it is recommended that a competent man be assigned to do all this work. Cotton waste is said to be better than wool waste for driving and engine truck boxes in warm weather, owing to the closeness of the cotton fibres. On important runs the packing should be examined previous to each trip. Oil cans should not be carried next to the boiler heads in warm weather, as it makes the oil too thin. The practice of some roads in not wiping engines is considered bad, principally because the men will not take proper care of dirty machinery. Babbitt metal on the sides of engine truck and driving boxes and on the faces of eccentric straps tends to prevent the heating of bearings. The oil cans carried on the locomotive should be improved by the addition of a valve attachment, so that the flow of oil can be regulated without waste. Several roads are using automatic devices for oiling the locomotive journals while running, and report that they work satisfactorily.

"The Use of Water on Hot Bearings of Engines and Tenders."

The committee consisted of Messrs. W. R. Scott, W. J. Anthony, J. V. Murray, C. H. Stalker and C. H. Hogan. On account of the ease with which connections are made, tenders are more generally equipped with water pipes for cooling journals than engines. The use of water on hot bearings, while running, is now common on roads having heavy, fast trains. There seems to be some difference of opinion as to whether it is best to partly cool a hot journal and then run a stream of water on it to the end of the division, or cool it sufficiently that it can be run without water, yet those roads which have had the most experience prefer to use water. All agree, however, that it is best to use a stream of water on a journal which has been hot during the previous run. Various arrangements have been tried for delivering water to the engine journals. On one road a small pipe is attached to the supply pipe of the injector, which furnishes cold water to the bearings, but as this arrangement cannot well be used with lift injectors, it is more common to make the connection to the discharge pipe of the injector, although the water in this case has a higher temperature. Some roads prefer to introduce the water between the wheel hub and box on both engine truck and drivers, and in this case oil can be used at the same time, being fed down through the top of the box; a few prefer to turn the water into the top of the box, allowing it to overflow at the sides and also reach the journal through the oil holes. Tender boxes for use with water should be packed loosely around the journal and tight against the dust guard, and the water turned into the box. One member states that the road with which he is connected has a mail train which runs 206 miles in about four hours, and in numerous cases the fine for being over five minutes late has been saved by the use of water on hot bearings.

"Uniformity of Cab Fittings and Their Arrangement for Accessibility and Utility."

The committee consisted of Messrs. C. P. Cass, W. R. Johnson, J. W. Hall, C. T. Stearns and A. M. Bickel. It is recommended that the different valves and fittings and their location be made to conform to a fixed standard for each road. All attachments taking steam from the boiler, with the exception of the lubricator and steam gage, should be connected with a combination stand or turret, having a dry pipe extending into the dome of the boiler. The water glass and gage cocks will also require separate connections, and on engines where the boiler extends entirely through the cab the gage cocks should be placed on the side convenient to the engineman. The brake valve and throttle lever should both be within easy reach of the engineman when leaning out the window. The best location for the lubricator is probably over the middle of the end of the boiler. The several gages should be grouped convenient to the engineman, and where the fireman attends the valve that regulates the steam heat the steam heat gage should be placed upon the same bracket with the fireman's steam gage. The blower should be within easy reach of the fireman. It is also recommended that the makers establish a standard diameter of dial for gages, and a standard style of marking.

Wide cabs are preferred, with large windows, and a front door opening outward and away from the boiler, which can be held firmly in any position. It is considered that each road should carefully study the matter of cab arrangement and bring each engine up to whatever standard is adopted at the time the engine is in the shop for general repairs.

Central Station Economics—II.

By William D. Ennis, M. E.

(Continued from Page 623.)

Economies of Station Management.—It is easy to estimate approximately the maximum efficiency obtainable with steam and electrical apparatus. In a station in which the boilers evaporate uniformly 10 lbs. of water per lb. of coal, into dry steam, which is delivered through a vertical pipe direct to compound condensing engines requiring 18 lbs. of steam per hour per indicated horse power, the latter being direct connected to generators of 94 per cent. actual efficiency, the combined friction losses of the engine and dynamo being 10 per cent. of the engine horsepower, an output of nearly 500 watts should be obtained per pound of coal burned. One-half of this figure is about the highest economy that has yet been reached in practice. It should be noted that the efficiencies in the above illustration are paralleled in many actual cases. The reason for the failure of power stations with apparatus of even this high degree of efficiency to reach such a combined economy may properly be discussed under the head of station management. The text for an article on such a subject might be taken from a statement made by Prof. W. E. Goldsborough, in a paper read before the American Institute of Electrical Engineers in April, 1898. This writer says: "A combination of boilers, engines and generators, however efficient they may be severally, does not necessarily produce an efficient station. Each station must be regarded as a special problem by the engineer, and must be studied as such."

The underlying cause of low station economy is the variation in the load. To this may be charged the larger part of the losses met with in every station. Broadly speaking, the efficiency of the station as a whole varies directly with the "load factor," or ratio of the average load to the maximum load. Since the equipment of the station must be designed to carry the maximum load, even though for a few moments in each day, the lower the average load as compared with the maximum load, the less will be the average efficiency of the plant.

Fig. 1 represents the "load curve" of a lighting and power station, the ordinates representing the load in kilowatts for each hour of the entire day. The line O B represents the maximum load and capacity of apparatus required. O A represents the average load and average capacity of apparatus. It is evident that if the load were uniform along the line A A^1, the investment in apparatus necessary would be less than it is under actual conditions in the ratio of O A to O B. Moreover, the apparatus in such a case could be designed so that the uniform load would be the load of highest efficiency.

The central station in practice diverges more or less from this ideal condition. The load factor, or ratio of average to maximum load (O A ÷ O B) in an ordinary lighting station, running day and night, is rarely above .30. In railway service somewhat higher values prevail.

Various methods of "evening" the load curve have been used by lighting stations, notably in the extension of power service at reduced rates during the day. Even in cases where separate dynamos and engines are used for power, it is often advisable to cut the price per unit used in the day hours in order to avoid the expense of idle boilers with banked fires. In electric railroad service such methods are usually impracticable, and the problem of equalizing the load curve is closely involved with questions of traffic management, the layout of the road and the headway of cars. It is in this connection that the advantage of the storage battery is apparent. By equipping the station with cells of sufficient capacity, the sizes of the generators in Fig. 1 might be required to be only just sufficient to carry a load represented by the line O A. From A to C, and again from D to A^1, the dynamos could carry the load, and in addition would charge the battery. From C to D the battery would take care of the excess of the load over the capacity of the generators. In practice a somewhat greater generator capacity than O A would be required, and the area over C D would be less than the areas under A C and D A^1, the ratio of the areas represented by the fraction $\frac{W\ Y\ C\ D}{A\ V\ C + D\ X\ A^1}$, expressing the efficiency of the battery.

In addition to the daily load curve, as a factor in determining the efficiency of a plant, the yearly curve, or variation of the load from month to month, while not affecting the economical operation of the apparatus, has an important bearing on the investment, and consequently on what may be called the "commercial efficiency" of the station. The yearly load factor is abnormally low on roads built for summer resort traffic, and exceptional inducements must be offered during the couple of months at the peak of the load to make it worth while for the investor to install a plant. In ordinary city railroads the load is at a nearly constant maximum from November 1 until May 1. During the summer the usual load gradually droops to a minimum at about the first of August. The enterprising street railroad manager then booms the parks, races, and other suburban attractions, in many cases so successfully that the peak of the load appears in the place where the lowest point might have been expected. All this means a better return on the capital invested, and the extra load gained during the idle summer months is of many times the value that an equal load would have been when the generators were already working close to their maximum capacity.

The practical application of what has been said lies in the fact that by keeping track of the variations, both daily and annual, in the load, the manager knows what kind of business he most needs, and can offer suitable inducements in order to obtain that business.

The influence of the variation in the load on the failure of electric stations to obtain the highest efficiency explains in great measure the fact stated by Prof. Goldsborough, quoted above. A more obvious explanation, which is often closely connected with the one given, results from the impossibility of having the various boilers, engines, and dynamos in separate and distinct series. Thus a 250-h. p. boiler may be feeding one 100-h. p. and one 125-h. p. engine, which may be driving respectively 75

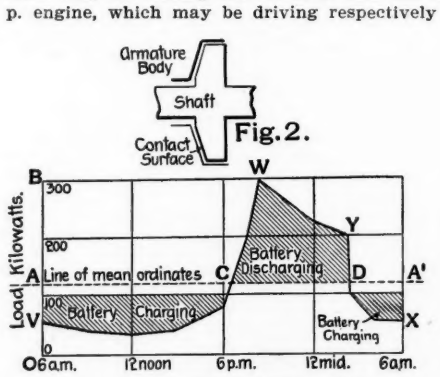


Fig. 2.

Fig. 1.—Load Curve of Power Station.

k. w. and 90 k. w. dynamos. Suppose the load to be at a maximum, and the entire outfit to be in action. If the apparatus has been properly rated for the load under which it is working, good conditions for high efficiency prevail. Now suppose the load to decrease to 115 k. w., a load which the 90 k. w. could take without injury. Unless the engine driving that dynamo is capable also of sustaining 20 per cent. overload it will be necessary to run both dynamos and both engines at a low efficiency, and the engines will be consuming an excessive amount of steam. But suppose that the 125-h. p. engine can work up to 160 or 170 h. p., by changing from compound to double-simple, or otherwise. The boiler supplying it will still be operating at a fraction of its load and at a small percentage of efficiency.

This is the condition met with almost universally. Even in a station where the load curve is moderately uniform, it is very rarely that boilers, engines and dynamos alike are working close to their load of highest efficiency. To plan the equipment of a station in such a way as to make possible the greatest number of combinations of the apparatus, is the province of the constructing engineer, and in no other way can he be of more service to a central station client than by accomplishing that object. Not only should every boiler be capable of supplying any engine, but duplications of steam piping, shafting, and belting may be made factors of safety in guaranteeing the continuous operation of the plant.

One of the latest improvements in this direction has been introduced in what is known as the "Arnold system," in which all generators and engines are connected to a common shaft, the engines being at the ends. Each generator and engine is connected to the shaft by a magnetic clutch, the principle of which is illustrated in Fig. 2. The shaft is cast with a bearing collar, which is powerfully magnetized by a current which

passes through a helix wound about the collar. The contact surfaces of the armature body and the collar are thus brought together with a pressure of several hundred pounds per square inch, sufficient to enable the latter to transmit rotation to the former. The magnetizing current is opened and closed on the main switchboard, and in case of overheating or something worse in the armature of one generator a throw of the switch stops the crippled machine and starts another. The system is thus a guarantee of continuous operation, as well as a partial solution of the problem of adapting the machinery to the load.

A third reason for Prof. Goldsborough's statement lies in the imperfect ways and means, the wilful stupidity and lack of knowledge which were too frequent in the early history of central station work on the part of those having their operation in charge. No standard of economy was known. Enginemen and dynamo tenders, and superintendents as well, seldom considered what should be the evaporative performance of their boilers; the steam produced was of a consistency similar to that of soda water, with respect to dryness; steam calorimeters were unused; accurate engine tests in electric stations were seldom made. Providing the dynamos produced current, little more was asked of them. When more scientific principles began to prevail, and the electric railroad was made possible, it was long before even an accurate basis for the rating of economy in power plants was proposed. The "watt-hours per pound of coal" was considered "close enough" for alternating circuits, when the watts were taken as the product of the volts and amperes.*

That constant—the watt-hour efficiency—is unsatisfactory as a basis, because of the variation in quality of the different coals used. It is often the case that the relative merit of a new kind of coal is determined by the station manager from the variation, up or down, in this constant when the coal is first introduced into the furnaces. From this reason, no accurate comparison of power station performances can be made without some data with regard to the value of the coal as fuel.

A rating now proposed is the watt-hours produced per 1,000,000 B. t. u. supplied to the plant. This is open to the familiar objections with regard to inaccuracy in determining the heating value of any given coal, but is undoubtedly the most satisfactory rating that has been suggested. For engineering tests some standard coal of which the calorific power is well known should be selected. This method alone can give data that will be of permanent value.

For purposes of comparison it is desirable in every station to have some approximate efficiency-constant by which the performance from day to day can be checked and the efforts of the employees more intelligently directed. A handy means of obtaining

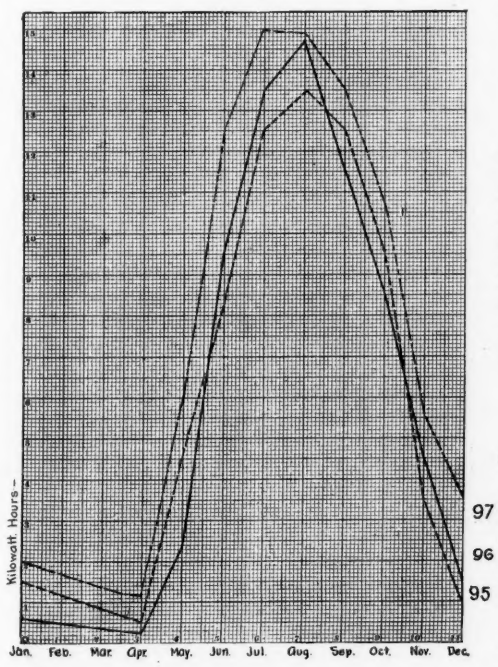


Fig. 3.—Station Record Chart No. 4.—Average Output Per Day, Consolidated Gas Co., of N. J.

these results which has been used by the writer consists of a blackboard with three parallel columns placed in the dynamo room. On this board are chalked each day three figures; watt-hours per lb. coal, or station economy; lbs. water per. lb. coal, or boiler economy; lbs. water per kilowatt, or combined engine and dynamo economy. The quantities necessary to calculate these were obtained by weighing the coal used and by reading every morning the registering watt-meters and water meter. Eventually, the results were tabulated, and furnished the basis of useful data. When for any cause, as an open circuit, the lights were out for a considerable time the "watt-hours" value decreased, demonstrating the effect of irregular load.

* Report of Committee of 1896, N. E. L. A.

What may be called the "mechanical records" of the station are best kept graphically. Such records serve the purpose of analyzing the operating expense into its constituent parts, showing conclusively where there has been extravagance and enabling the manager to fix upon the responsible person. The most convenient and complete plan of keeping such records that the writer has examined, was developed by Paul Doty, M. E., when General Manager of the Consolidated Gas Company of New Jersey. That corporation is both a gas and electric light company, and the records plotted under the direction of Mr. Doty were the outgrowth of a similar system used by him in gas works.

Fig. 3 illustrates one of the charts which were used. The ordinates represent in this instance the average daily output in kilowatts for every month during three years.* Each month the record is continued, and the chart shows in compact form facts which it would require several hours' time to obtain from the books. Curves similar in arrangement to that shown were plotted for the following quantities:

Total sales for each month.
Ratio of sales to output (line and transformer efficiency).
Pounds coal used per kilowatt of output.
Cost of coal per kilowatt of output.
Gallons oil used per kilowatt of output.
Cost of oil per kilowatt of output.
Expense for station labor per kilowatt of output.
Total station expense per kilowatt of output.

The last figure, from a commercial standpoint, is of much greater consequence than the "watt-hours per lb." It represents the efficiency of men and machines, and measures the ability of the station manager, modified, of course, by the character of the resources at his disposal. The question whether additional expense to improve those resources is justifiable is to be determined in every case by comparison of the average results produced with the average results produced elsewhere under equally competent management.

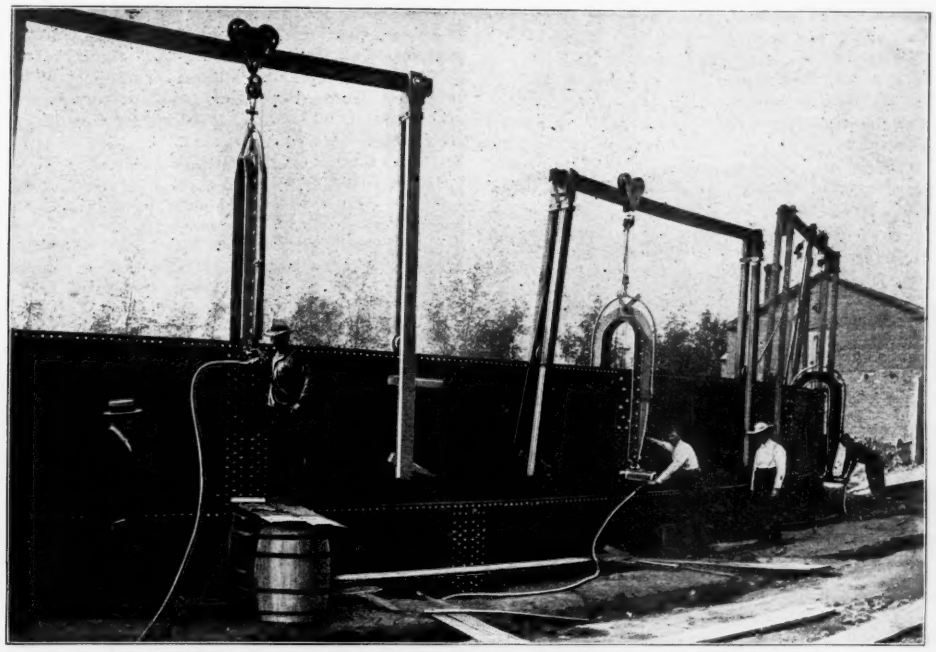
* Each of the smaller divisions on the ordinates represents 10 kilowatts, so that two ciphers should be added to the figures given on the extreme left of the diagram in order to make them agree with the actual values. Thus, 1, 2, 3, etc., should read 100, 200, 300, etc.

Pneumatic Riveters for Tanks.

An interesting application of pneumatic riveting machines to heavy tank work is now being made at Washington, D. C., where a gasometer 175 ft. in diameter is being erected for the Washington Gas Co. by the Stacy Manufacturing Co., of Cincinnati. This tank will consist of four telescopic sections, each 35 ft. deep. The lower section has $\frac{5}{8}$-in. steel bottom plates with side plates 1 in. thick and 6 ft. wide, while the thickness of the plates of the upper sections is reduced toward the top. The rivets in the lower section are $1\frac{1}{2}$, $1\frac{1}{4}$ and 1 in. in diameter and $\frac{3}{4}$ in. rivets are used in the other sections.

All the riveting is done by eight yoke riveters, having a reach of 6 ft., which were built by the Chicago Pneumatic Tool Co. These consist of a yoke frame made of plates and angles, upon which are mounted heavy pneumatic hammers of the Boyer type. Four of these hammers have a $1\frac{3}{4}$-in. piston and a stroke of 6 in., while each of the others has a piston $1\frac{5}{16}$ in. in diameter and a 5-in. stroke. As shown by the engraving, each riveter is suspended by a block and tackle from the top of a traveler along which it can be moved through a distance of about 12 ft. The traveler is supported by rollers which run on the upper edge of the side plates, and the frame is held in any position by wedges driven between the upright posts and the tank plates. The whole forms a very convenient arrangement, which can quickly be moved from one point to another.

Compressed air is furnished at a pressure of 100 lbs. per sq. in. by a compressor run by steam from the boiler of the hoisting plant. Two men are required to tend each riveter, and we are told that these two can do the work of about nine hand riveters. In one day, of 10 hours, 530 $1\frac{1}{4}$-in. rivets were driven with one machine, and 700 $\frac{3}{4}$-in. rivets is



Pneumatic Riveting on a Gas Tank.

not an extraordinary day's work. These riveting machines are now extensively used in many large shipyards, but this is the first time that pneumatic riveting has been used on such a large scale for tank work.

Quinquennial Report of the Committee for Building the Siberian Railroad.*

On the 10th of December, 1893, by Imperial decree, a committee was established to take charge of the building of the collective works for the Siberian Railroad and the allied enterprises, including the acquirement of the necessary land, the discovery and development of the natural resources of the territory, the establishment of transportation across the water ways, etc. For the President of this committee was named the Crown Prince Nicholas II. (since become the Emperor.) The beginning of the work of the Crown Prince, as far as the public knows, took place in the far East, where the cornerstone of the undertaking was laid at Vladivostock, and the progress and present status of the work are shown by the official detailed report of this committee to the Emperor, from which the following facts are taken.

The West Siberia portion, 877 miles long, is now entirely finished and supplied with the necessary rolling stock, and has been incorporated into the General Railroad System of Russia. The Middle Siberian Railroad has been opened for regular traffic between the River Ob and the City of Krassnojarsk, while from Krassnojarsk to Klutschinskaja, 218 miles, it has been turned over for immediate traffic. The track is also laid as far as the village of Tulun, which is at a distance of 239 miles from Irkutsk. The Tomsk Branch Line has been opened for traffic since 1896.

The Russo-Chinese Bank, which was formed in accordance with the recommendations of the Siberian Committee, made in 1896, has secured from the Chinese Government a concession to build and equip a railroad within the limits of Manchuria, and for this purpose has organized the "Eastern Chinese Railroad Company." The Emperor has ratified this action by an Imperial order. With this disappeared the necessity for building the Amoor River portion of the line, on which considerable difficulties would be encountered. It would also be superfluous to extend the Trans-Baikal Line eastward to Stretensk. In place of this line, the project was undertaken to build a branch line from the Trans-Baikal Ussuri Railroad to the Chinese frontier, a distance of about 276 miles, which will effect a shortening in distance from end to end of the Siberian Railroad of about 339 miles. The exploration of the route for this line was made in the summer of 1897, but the exact location of the line itself has not yet been definitely determined. Since, however, it appeared indispensable immediately to undertake the construction of this line, the committee has decided to proceed without waiting for the confirmation of the previous estimates of the cost.

The work of the commission in connection with the Southern section of the Ussuri Railroad was confined to providing the necessary means for the completion

*Translated from the Zeitung Des Vereins Deutschen Eisenbahn-Verwaltungen, June 4, 1898.

of the work, which took place in the summer of 1895. As to the North Ussuri Railroad, the track was laid the whole length of the line, and the first through train from Chabarowsk to Vladivostock went over the Ussuri Railroad Sept. 3, 1897. Since the Imperial decree contemplated a continuous line of railroad, and there are works of very great difficulty to be built, the committee determined to build meantime a line from Irkutsk to Lake Baikal, and to establish across the lake a regular line of freight steamers. In the beginning, it was proposed to build the line along the right bank of the Angara River, but as this proved not to be a favorable location, the line will be built on the left bank of that river. The cost of this line is estimated at 2,400,914 roubles. At present the earthwork for a distance from Irkutsk to Lake Baikal is finished, and nearly all the bridges and buildings are erected.

After an examination, it was decided to establish across Lake Baikal a steam ferry for railroad trains, and it is in contemplation by the use of ice breakers to extend the time of navigation to ten months in the year. The ice breaker will for the present be constructed in a special dock, while the iron work is being brought by the Siberian Railroad. Beside the determination of the principal question whether it was desirable to construct a railroad line from Irkutsk to the Baikal and to establish a ferry on that lake, the committee decided that such a connection of the Siberian Railroad with the Trans-Baikal territory should in no case delay the construction of the continuous line across Siberia, and has therefore determined to proceed at once with the surveys and the technical investigations of the line around the Baikal.

The present status of the works already under way and those to be undertaken are set forth in the report by the following figures:

For the whole line of the Siberian Railroad from Tscheljabinsk to Stretensk (not including the railroad around the Baikal), with the branch lines to Tomsk and from Chabarowsk to Vladivostock, a distance of 3,268 miles, about 91,218,800 cubic meters of earthwork are to be done, for which not less than 19,000,000 days' work are necessary. There are 562 miles of snow sheds; 118,000 telegraph poles are necessary, and 6,600 miles of telegraph wire. If the whole rolling stock were united in one train it would have a length of 53 miles. During the working part of the year 1897 the track was laid on 673 miles and the grading done on 563 miles. The total length of the line already built is 4,230 miles. To supplement the credits assigned to the building of the West and Middle Siberia and a portion of the Jekaterinburg-Tscheljavinsk Line and the South Ussuri Railroad 14,000,000 roubles are fixed for the organization of the auxiliary works to be undertaken in connection with the building of the railroad. This is in general for the development of the territory lying contiguous to the railroad and for the building up of the business and industries of Siberia. The amount determined upon, therefore, averages 4,000 roubles per mile. On this basis the available funds were in the year 1897 about 7,900,000 roubles, corresponding to the total length of the North Ussuri and Trans-Baikal Railroad, also the branch from Irkutsk to the Baikal, and the junction line to the Chinese eastern frontier. The total funds for these auxiliary works in connection with the Siberian Railroads were in the years 1893 to 1897, 11,957,327.81 roubles. It is estimated that for the year 1898 there may be derived from these sources 3,718,369.97 roubles.

The most important application of these funds is undoubtedly in the separate works for the development of the country. Upon the correct solution of this question depends the entire success of the Siberian Railroad in its economic relations. It is necessary to promote as much as possible the development of the country, that in time the sparsely populated portions of Siberia may become thickly settled and skilled workmen created, that by means of these the existing and yet undiscovered treasures of Siberia may bring to itself and the mother country the greatest profits. Should these industries fail and the colonization schemes not prosper, then the most important aim of the whole undertaking has miscarried. Then the Siberian Railroad can indeed be looked upon as a most important link in a through line, and thereby perhaps bring to the world's business a profit, but it may be questioned whether the great enterprise Russia contributes to the world will bring a profit to herself. Therefore it is proper and of the greatest concern that these auxiliary works should be treated not as accessories, but as a principal part of the scheme and handled with energy and the devotion of every important means for the accomplishment of the end in view.

Colonists are therefore not only to be induced to settle in Siberia, but their welfare and prosperity will be looked after. Churches will be erected, schools built, physicians procured and cared for, etc., etc. In short, the committee has shown a remarkable activity in these extremely difficult but equally important enterprises.

In conclusion, it may be remarked that the Siberian Railroad itself must be looked upon as only a part of the collective enterprises. The report discloses that in the choice of the route between Tscheljabinsk and Jekaterinburg the committee had in consideration the industries in the Ural. In pursuance of this idea the committee has chosen for the railroad line a direction through that part of the country where the greatest number of industrial establishments are to be found, in consequence of which the line joins the Ural at Jekaterinburg, a city of a large number of inhabitants, and at the other end begins at Tscheljabinsk, which is most important for the traffic across Siberia; and secondly, the line runs along the west slope of the Ural in close proximity to the manufacturing towns of Ssewersk, Polewok and Werchne-Ural and Kyschtym, and terminates at Tscheljabinsk, on the Siberian Railroad. The cost of the line, without reckoning the rolling stock, amounts to 6,475,258 roubles. This line was completed in the fall of 1895 and regular traffic over it commenced with the year 1896.

Boston Convention American Street Railway Association.

The seventeenth annual meeting of the American Street Railway Association was held at Mechanics' Hall, Boston, from Tuesday to Friday of last week.

President Lang of Toledo, O., called the meeting to order at 11 o'clock on Tuesday and introduced Mayor Josiah Quincy of Boston, who delivered an address of welcome. In his address, Mr. Quincy referred to increased transportation facilities since electricity had been applied to cars and to the influence that electric railroads had exerted on civilization.

The President's address was largely devoted to an historical review of the events connected with the annual meetings of the Association. Mr. Lang paid a high tribute to the technical press, and in the course of his address, said:

Let me here call attention to the necessity of having at our meetings papers which will interest all the members—not only the mechanical and electrical engineers, but the General Managers and even Presidents of companies. We need all these officials with us at every convention, hence we must provide something of interest to them.

I venture to suggest a few subjects arising almost daily where in this way very helpful information could be obtained, viz.:

The suburban railroads: On what terms and conditions should they enter over our tracks, and how can their building be encouraged?

The issuing of transfer checks or tickets, and how abuses connected therewith can be limited.

The equipping of buildings with automatic sprinklers and the economy resulting therefrom.

The cast or electric welding of rail joints and the saving effected in current and cars.

The discussion or agitation of municipal ownership of franchises and the most intelligent way to treat the subject.

To what extent companies should engage in the amusement business and the best methods of conducting the same.

A comparison of the cost of materials and supplies and expenses of operation.

How best to promote the interests of employees and in return secure from them the highest degree of service and loyalty.

I desire also to call attention to our fellow workers and associates, the Accountants' Association, which hold their meetings simultaneously with ours each year.

The report of the Treasurer was presented, showing the expenses for the year amounted to $5,651.37, and the balance, Sept. 5, 1898, $3,656.28.

The association has a membership of 161 companies.

Mr. Richard McCulloch's paper on "Comparative Earnings of Single and Double Truck Cars" was then read. It will be published with the discussion in a subsequent issue.

Wednesday Session.

The first paper of the session was on "Carrying of United States Mail Matter on Street Railways," by Mr. W. S. Dimmock, General Superintendent Omaha & Council Bluffs Railway & Bridge Co., Council Bluffs, Ia. The following are extracts from the paper, with notes on the discussion:

There is probably no one thing which is of more importance to the perfection of an absolutely satisfactory mail service than the saving of time. This is probably the most potent argument in favor of the electric car service for the transmittal of mail matter to and from depots, sub and suburban stations, to the main post offices. In the case of the Omaha office, where I have had the best opportunity for observation, a noticeable gain is made in the service between Omaha and Council Bluffs, a distance of five miles, and Omaha and South Omaha, of the same distance. Here the advantage is not confined to the saving of time, but in the increased number of dispatches it is possible to make. . . .

Before the electric line between Omaha and Council Bluffs undertook to handle the mails between these cities, the Union Pacific had about 11 trains in 24 hours, and part of these trains at night, after business hours were over for the day, thereby making the mail service so very unsatisfactory that the public began to clamor for the mail to be carried by the electric railroad from the time the road was open. We finally made a contract with the Government to carry the mails between the two cities, and the public discovered at once that we were transporting these same mails from Council Bluffs to Omaha in the same time that it formerly took to deliver the mail by wagon from the Council Bluffs' post office to the Council Bluffs depot, thus saving the time consumed by the Union Pacific train between the cities and time consumed by wagon from depot to post office in Omaha.

Now let us investigate the compensation. After it was discovered that the electric railroads could handle the mails with so much satisfaction to all concerned, the managers of the railroads thought they saw a great protection during strikes, etc., in the Government, and were ready to carry the mails at most any price, but I believe experience has taught us, through some of the strikes in the East, that they did not find the protection anticipated. The electric railroad managers were figuring on the basis of what the Government had done for the steam roads during such troubles, and, while seemingly the comparison was a good one, it was erroneous.

It is true the Government has made some effort to arrive at the cost of carrying the mails, but in doing so, if you will read the report of the committee to the Postmaster-General under date of June 25, 1896, which the Government at Washington will furnish you on request, you will see the report treats mostly upon finding out what expense the railroads are put to in handling the mail, and not upon how much the value of the same is to the public. This report makes an allowance of three cents per mile for carrying pouches upon electric trains, while in the same report they state: "The closed pouches upon the street cars should be compared with the Star Service, which it replaces," and in the same breath the Government states: "The Star Route service costs 4.94 cents per mile."

In Council Bluffs, they pay more for the wagon service to haul the mails to and from the depot, a distance of $1\frac{1}{10}$ miles, than they pay the steam road for hauling it from Council Bluffs to Omaha. Why? Simply because the steam roads are post roads and compelled to carry the mails as the Government dictates, while in the wagon route they are dealing with an individual, and it is impossible for them to make a contract for any such unreasonable terms.

When the Omaha & Council Bluffs Railway & Bridge Company first closed the contract with the Government for carrying mails between Omaha and Council Bluffs, the Government allowed this company $100 per month, and was satisfied it was getting value received until other electric roads commenced to carry the mails more for protection than revenue. The Government then immediately took advantage of the time and opportunity to make an investigation, of which the report of June, 1896, was the result, which reduced our compensation to $50 for nearly the same service. Had the American Street Railway Association handled this matter in the past, as general managers and passenger agents of steam roads handle their affairs, the result of the Government committee's investigation would have been different. No doubt the companies spoken of in the committee's report to Postmaster-General Wilson, under date of June 25, 1896, as giving information as to the cost of carrying mails and operating mail cars, have since learned through experience that their estimates were entirely too low, although given in good faith at the time. The Chicago City Railway states that the revenue derived for running mail cars barely pays the expenses. Nearly every manager with whom I have communicated is dissatisfied with the remuneration.

In December, 1897, a cry went up from Washington as to how the steam railroads were swindling the Government. This led to an investigation. It was found that the Government was making thousands of dollars through the arrangements of weighing mails only every four years and obtaining car space unpaid for.

It is not for me to say how much we should receive, but for the members of the Association to take up the subject by discussion and work it out. This class of service is in its infancy; it will grow from year to year, and after a while be worth thousands of dollars to us annually. For the present we are compelled to abide by the appropriation of Congress and the rates made by them, but the question before us is how can matters be improved upon to benefit the electric railroads in the future.

Discussion.

Mr. Sargeant, Boston.—In 1895, our company in Boston was approached by the Post Office Department to see what could be done in the establishment of a trolley mail service, but as the writer of the paper has said, there was not sufficient money available for the purpose, except some funds left over from the "wagon fund." We undertook to inaugurate the service, and take what revenue might be obtained by a transfer from this fund, as a test of the feasibility of the scheme. This was the first city in which the trolley mail cars were handled in the same manner as the steam railroad mail cars; that is, with a messenger and clerks to assort the mails on the car. We began May 1, 1895, with seven mail cars, making 12,670 trips yearly. In 1898 we are making 15,517 trips yearly, and the mileage will be upward of 170,000 miles.

There were originally 12 stations, to which have been added, one at Charlestown, Jan. 1, 1897, and one at Roxbury Crossing, Feb. 1, this year, on which date also a pouch service was established between Somerville and West Somerville. Connections have always been made with Boston & Albany and Providence depots, and Union station; 16 men are constantly employed, eight conductors and eight motormen.

Out of about 45,000 trips run (to Jan. 1, 1898), there were 360 failures or irregularities, or about .08 per cent., and that was almost wholly due to the snow and the consequent blockading of teams in the narrowest streets.

Seven cars handle 100,000 pieces of mail daily. The system is under the supervision of the New England Superintendent of railroad mail. In other cities the trolley and cable service is under control of the local postmaster. . . . The first practical illustration of a street railroad post office was in Boston. Other cities had street railroad mail cars first—St. Louis and Brooklyn—where the mail was simply carried in bulk and delivered the same as if by teams, not being worked in transit; but Boston street railroad cars were the first to be patterned after steam railroad cars, with racks and all appliances for working the mails in transit—transferring, so to speak, so much working space and clerks from the main post office to the post office on wheels, thereby losing absolutely

no time in handling matter, and enabling the business man to get his mail early in the morning, rather than late in the afternoon, with nearly a whole day saved for him. One car has an electric cancelling machine, with a capacity of 2,000 cancellations an hour. . . . Each car handles nearly five and a quarter million pieces of mail, or a total of 36,561,170 pieces for the seven cars in a single year. . . .

What the writer of the paper says about the question of compensation I think is very true and important. I believe that something might be done by the Association. We have never received a compensation here which has more than paid our running expenses. I think that any rate that should be fixed in an arbitrary manner, so much a car mile for carrying the mail, is entirely unfair. It all depends, it seems to me, on the conditions; what service is rendered, what the character of the service is, whether combined with passenger service or whether it is done with independent cars, and what the local conditions of expenses are. . . .

In some other cities the conditions are quite different; possibly they pay higher wages. On the other hand, some mail routes are one straight away suburban route, where a rate of 10 cents a mile would be a good rate, compared with one at 30 cents a mile where the conditions are like those in Boston.

I feel that what our Congress may need is enlightenment; that they do not comprehend the fact that the street railroad service is better than the steam railroad service, and is of a different character, and something which is such a public benefit that it would be a pity to have it stopped, and yet which is something we cannot afford to continue unless we are properly remunerated. I am not without hope that something may be done through our Association by getting at the conditions of service through the Secretary, in correspondence with different cities.

Mr. Beggs, Milwaukee.—The Milwaukee Company at present is going through the preliminary stages of establishing a mail service upon our lines which, up to this date, has not been instituted, not even to the extent of carrying the pouch.

I may say for myself that I have not been enthusiastic over it, because of the fact that it did not seem to promise a profit; and I think, as has been truly said in the paper, that the amount of protection that the various roads expected when they were established as mail routes has not been of the advantage to them that they hoped for, and it was because of the advantage that many of these roads expected to derive because of carrying the mail, that induced them to fix an entirely inadequate rate of compensation to be paid by the Government. The Government took that rate of compensation, fixed for the first few roads upon which mail was carried, and attempted to establish that as a basis of compensation to all roads whose services they required. . . .

As to the question of carrying mail pouches on the regular cars of the system, I seriously question its advisability. It may possibly be necessary in some of the smaller cities. I do not favor carrying mail pouches on the platforms of our cars. The platforms, as we all know, are too valuable to use to carry a mail pouch at three cents a mile.

Mr. Farson, Chicago.—When the street railroad mail service is once started there is no danger of going back to the old system, because the people will insist on the very best service obtainable. . . .

I move that a committee of five be appointed by the chair to act under the directions of the Executive Committee and communicate with the different members of the Association and get all the facts before them, keep the Association advised of their proceedings, and that they have authority to confer with the post office authorities.

Mr. Robert McColloch, St. Louis.—I would state for the information of the Association that one of the roads in St. Louis made a contract with the Government to carry the mail and had two cars built especially for the purpose. The compensation was entirely inadequate for the service alone, not counting the investment in special cars.

Mr. Dimmock, Council Bluffs.—If we allow the present rates to continue, there will come a time when they will demand of us to carry the mail at the rates the same as they pay the steam roads, as mentioned in the paper, and that point should not be lost sight of.

Mr. Payne, Milwaukee.—Recently I had an interview with some of the department officials, the Postmaster-General and Assistant Postmaster-General, in regard to this subject. I found them much interested in this question, but the difficulty with them is the lack of funds. . . . I have found the department officials willing to investigate the situation in the various cities and to act as far as the means at their command will allow.

Mr. Farson's motion was then put to vote and carried.

"Maintenance and Equipment of Electric Cars for Street Railways," by Mr. M. S. Hopkins, Electrician Columbus Street Railway Company, Columbus, O., was then taken up. The main points touched on are included in the following extracts:

Car Bodies.—For years car builders have attempted to devise a car body which would be equally durable in both summer and winter, but judging from the character of equipment now in use on the majority of roads, such a car has not yet been produced. The combination car with movable parts is not satisfactory for winter use, is troublesome, noisy and cold, and is lacking in many of the essential features of the open car for summer service. The open cross-seat car of the barge type, with running boards on the side, seems by far the most desirable type of car for summer service, affording the largest seating capacity and the best facilities for receiving and discharging passengers, which is a great advantage in city service.

The long car body seems to be growing in favor with the railroad manager, due to the comparatively small increase in operation in comparison to increased carrying capacity and its allowing of the increase of headway or decrease in number of cars run, resulting in a large decrease in operating expense per passenger carried.

In the construction of box-car bodies the trusses should be as deep as possible and great care taken to secure a perfectly rigid fastening at end of sill, as the slightest deflection throws an undue strain on joints and framing of car body.

Trucks.—Trucks should be made up of a small number of parts; cast and malleable pieces should be the lightest consistent with strength. The springs should be so arranged as to prevent oscillation and give an easy riding car under all conditions from no load to full load, and when the style of truck is of such design as to prevent the use of an under truss, the spring base must be exceptionally long and the end springs so arranged as to relieve the strain on the car sills.

The brake mechanism should be so designed that the strains will be equally distributed on all parts throughout its range of movement. The pins should be of ample size to provide for wear. The slider method of support for brake beam will be found more satisfactory than the loop support The minimum amount of friction should exist between brake staff and shoe and release springs as light as possible.

Electrical Equipment.—In a railroad motor the mechanical and electrical features which influence its maintenance should receive very careful consideration. The bearings should be large and lubricated by oil from below and cup grease from above, and so designed that the drip from the bearings will fall outside of frame. The armature should be so constructed as to permit the shaft being pushed out without disturbing the commutator and winding. I am glad to note that the importance of light weight and slow peripheral speed of armature has been recognized in the recent design of railway motors. From a theoretical standpoint the cradle or side bar suspension has the lead. The dead weight is largely removed from axle, thereby eliminating to some extent the hammer blow on rail-joints, decreasing the wear on axle brasses and securing the better alignment of gears; yet, in practice, the nose suspension is still preferred by the writer, as the car starts more smoothly—the weight of motor on spring supports overcoming the jerk and quiver so common in other methods of support. The specifications for railroad motors, as drawn up by leading manufacturers of today, amount to practically nothing, and would suggest that the purchaser of motors in his specifications clearly define the rating, heat limit and efficiency.

Specifications for resistance should provide that the last two points of resistance be of sufficient capacity to allow of their continued use as running notches, especially where cars are operated in city service.

There are several types of magazine fuse boxes or cutouts and single cutouts using a special fuse, which possesses a number of points of merit. Without going into detail, it is the opinion of the writer that under average conditions the standard magnetic blowout fusebox, using a link fuse, is preferable.

Care of Equipment in Car Houses.—Generally one of the following three methods is used for daily inspection of car equipment, namely: Inspection of cars for each trip, inspection of equipment at night by motor inspectors, inspection of equipment during the day by motor inspectors and repair men.

In regard to the first case, that of the trip inspection, I would say that in the present degree of perfection attained by makers of equipment trip inspection should not be necessary, and, excepting on interurban lines operating at high speed over long runs, is of doubtful value. In regard to night inspection, the experience of the writer has been such as to absolutely condemn such a method as expensive, slovenly and unsatisfactory.

Considering the average conditions, and assuming that the equipment is in good condition, it is the opinion of the writer that the taking of cars to shops once every six months should maintain the equipment in good condition and assure its efficient operation.

Motor Bearings.—After a series of tests, covering quite a period of time, as to the wear of various materials used in motor bearings, the writer feels warranted in making the statement that under the ordinary conditions either the best grade of babbitt or brass bearings should give a longer life than six months, and when a bronze bearing of the proper mixture is used and properly lubricated a life of twelve months can safely be expected. The method of lubrication largely affects the life of brasses. After long tests with various lubricants the writer has discontinued entirely the use of grease on armature brasses, and in most cases on axle brasses, a good grade of engine oil, supplied through wicks, being more satisfactory and economical.

Street railroads working 25 or more cars will find it economical to cast and machine their own brasses. A small brass furnace can be erected cheaply, and after suitable jigs, which can be attached to any lathe, have been provided for boring and turning, the cost of casting and boring is very little more than the cost of rebabbitting, especially where babbitted brasses are machined after boring, while the life of the bronze bearing is far in excess of that of any babbitt yet tried.

Whenever the commutator shows signs of burning or blackening, steps should be taken at once to prevent it. It is not advisable to try to prevent this by the continual sanding of commutator by motor inspectors, though the occasional cleaning up of the commutator with sand paper is necessary with all motors.

The kind of brush used is important. Brushes should be of soft, close-grained carbon treated with a good lubricating compound—one which does not flow too freely from the heat from the motor, and which will not burn and carbonize on commutator. As a rule the tension on the brushes of railway motors is too light.

The Electrical Testing of Equipment.—Judging from my own experience, it is neither necessary nor advisable to test periodically the insulation on the equipment, but to make such tests only in cases where the motors are not working properly. The proper training of motor inspectors as to the little points about railroad equipment which clearly indicate trouble with motor, will locate in nearly all cases trouble due to weak insulation, so that it can be remedied before any serious damage has resulted to any other part of the equipment.

Trucks.—Much has been written of late on the subject of car wheels, their wear and alignment, and still street railroad managers are careless about their wheels. Too much care cannot be given to the sizing and alignment of wheels and the pressure with which they are forced on the axle. At least 50 per cent. of the wheel removals throughout the country are caused by broken or sharp flanges or a broken wheel. The use of sand influences largely the life of wheels, but the conditions vary so widely that I would not be justified in saying that in no instance should a sand box be placed upon a car. I will say, however, that where it is possible to successfully operate without them, sand boxes should be discarded and other means used for sanding the track. In most cases it is far more economical to fit up a special car capable of carrying a large amount of sand, and sand the track for, say 100 ft. before each point where a stop is likely to be made and on grades and in places where the track is exceptionally slippery, than to sand the rail for its entire length.

Repainting of Cars.—The experience of the writer has clearly demonstrated that it is satisfactory to repaint cars without removing all of the old paint. Patent varnish removers, sealers, etc., are a snare and a delusion.

After a number of trials of various floor paints and paints mixed especially for the purpose, the conclusion has been reached that there is nothing equal to pure white lead and linseed oil and suitable color for the floors of all cars.

Unquestionably the truck of the car should be painted with a good grade of lead paint, as it prevents rust, decreases renewal of bolts and adds greatly to the general appearance of the car. A handsomely painted car body mounted on a dingy, rusty-looking truck has a half-finished appearance, to say the least.

Discussion.

Mr. Sloan, Chicago.—There are some of the details with which I do not entirely agree. For instance, the gentleman states that he utterly condemns night inspection. With us night inspection works quite satisfactorily for several reasons, the main one being that we change all of the brushes every night.

I have had commutators in for a year without one-eighth inch wear, and I believe it is entirely due to the fact that we change the brushes every night. I think a car cannot be overhauled too often; with us it goes on constantly.

Mr. Hawken, Camden, Mo.—The electric people have always advised a certain point for hill climbing and efficiency of running the motor. It has been stated that the series point with the fields in shunt has been the most efficient point, and I noticed that the rear motor on this point does about all the work, and the forward motor very little. I know of one road in particular that uses this point very largely, and they have a great deal of trouble burning out armatures.

Thursday Session.

The first paper discussed the subject, "To What Extent Should Street Railway Companies Engage in the Amusement Business," by Walton H. Holmes, General Manager, Metropolitan Street Railway Company, Kansas City, Mo.

In his paper Mr. Holmes considered the question from many standpoints, observing in all, however, that local conditions govern largely to what extent street railroads should engage in the amusement business. He pointed out that cars must be accumulated in large numbers where such attractions as public parks and entertainments are open to the patrons of the road, in order to take people away at the proper time.

Discussion.

Mr. Wyman, New Orleans.—I have been very positive in my belief for many years that a street railroad man should stick very closely to his line of work, and that he had very little freedom or time for going into the amusement business or any other sort of business that was not intimately connected with the daily operation of his cars, the management of his power plant and that style of business and methods that pertain specially and particularly to the working of his road. I have discovered, however, that, as Mr. Holmes very truly says, local conditions affect this matter to a very large extent. So far as the congestion of travel which Mr. Holmes speaks of on any particular line is concerned, I do not think that I fear that to a great extent. We are always willing to have a good deal of congestion in running a street railroad. One thing we must always remember, and that is that street railroad riding is, after all, a habit. As a habit it is growing. The main question is, Does it pay? I think it does, and for the reasons I have suggested.

Mr. Davis, Williamsport.—The experience in Pennsylvania among the small parks is that the profit derived from the amusement business is not in proportion to the risk of the money spent, and in quite a majority of places the rule is that it is almost impossible for the manager to separate the hot weather travel on amusement lines from the travel due to the entertainments or park itself.

Mr. Holmes, Kansas City.—Speaking for Kansas City, I am convinced that we had better let the city furnish the parks, and we contribute toward the music and attractions in the parks. The real difficulty in establishing public parks in Kansas City was due to the fact that the street railroad companies

had been quite liberal in providing parks. The people expected the companies to do it, and it is hard to overcome that feeling.

Mr. Beggs, Milwaukee.—Our experience for two years was that where we paid the entire expense, as we did, taking the daily receipts of the particular lines leading to the resorts in which these entertainments were provided at the sole expense of the company, we never got back at the outside more than seventy-five cents for each dollar spent.

Mr. Harrington, Camden.—We have a park and we find that, while our travel is increased, owing to the expenses of operating the park, we received only about 70% income from the park of what the park cost to run.

Mr. Clauflin, Boston.—At Norumbega Park we have had a very different experience from some who have spoken. Our road carries its patrons a distance of five and a half miles for five cents. We sell on our cars for 15 cents a round-trip ticket, which includes admission to the park. We charge people going on foot or bicycles 10 cents admission. That has a tendency to bring passengers to the railroad company and it has been a great success with us. The result has been that the park has maintained itself, and costs the company nothing whatever for its maintenance. The revenue derived by the road has been net.

Mr. Lang, Toledo.—Our city has 140,000 inhabitants. We are conducting a place of amusement on the lake shore, about five and one-half miles from the center of the city. It was not established by our company, but is now controlled by us, because we have purchased the road that built it. At the outset, when it came into our possession we found it was losing money. It was said to have cost in the neighborhood of $65,000 in land and buildings, and finding that it was running behind, we imposed an admission fee of five cents. We found that last year we came out a few hundred dollars ahead of the working expenses, but we run the Casino company as an entirely independent company, without any relation to the railroad company. It increased the earnings of the railroad companies about $40,000 last year.

Mr. Wyman, New Orleans.—We have a resort on Lake Pontchartrain, about six miles from the city, with a round trip car fare of 15 cents. Our weekly payroll for amusements runs from $2,000 to $2,200 per week. The park has been worked as expensively as that for the last two or three years. We keep an accurate record of our operating expenses and our receipts, keeping that road entirely separate from any other road, and we find that our proportion of receipts to expenses varies little from the ordinary electric road. In winter we do not do so well. Our operating expenses run from 70 to 80% of the gross receipts, and that includes the winter time, when the people do not go out.

Mr. Chapman, Chicago.—At Grand Rapids, Mich., where the lines were converted from cable and horse cars to electric, and a very pretty park was built at the lake, where the average haul was four miles from the center of the city, we commenced in a small way. It gradually became more and more expensive, and while the patronage largely increased the expenses increased in much greater proportion. They have since found it advisable to build a small auditorium, and they help out their roads by charging admission to the reserved seat section of this auditorium, allowing the people to stand on the outside without extra charge. They furnish attractions costing them from four to six hundred dollars a week, and are making the amusement feature more successful than it ever was before, since the days of the introduction of the bicycle. Before that time it was very satisfactory.

Mr. Calhoun, Elmira.—One point does not seem to have been touched upon by any of the speakers, and that is the increased liability to accidents. It would seem to me that in the matter of expenses the question whether these parks pay or do not pay, the matter of damage suits and of the liability for damages that are incurred should be considered.

The following officers were then elected:

Officers Elected.

President, Chas. S. Sergeant, Second Vice-President Boston Elevated Railway Co., Boston.

First Vice-President, Henry C. Moore, President Trenton St. Railway Co., Trenton, N. J.

Second Vice-President, Ernest Woodruff, President Atlantic Consolidated St. Railway Co., Atlanta, Ga.

Third Vice-President, Walton N. Holmes, General Manager Kansas City Railway Co., Kansas City, Mo.

Secretary and Treasurer, Thos. C. Penington, Treasurer Chicago City Railway Co., Chicago, Ill.

Executive Committee: Albion E. Lang, Toledo, O.; George E. Yuille, Chicago; Frank Jones, Memphis, Tenn.; John I. Beggs, Milwaukee, Wis.; Ira McCormack, Brooklyn, N. Y.

The next place of meeting will be Chicago, Ill.

The President then appointed the following to serve on the committee to investigate the question of carrying of United States mail matter on street railroads: John T. Burnett, Boston; Henry C. Payne, Milwaukee; Ira A. McCormack, New York; D. G. Hamilton, Chicago, and W. S. Dimmock, Council Bluffs.

Mr. T. Y. Dzushi, Chief of Finance and Manager of Stores of the Imperial Government Railroads of Japan, and Mr. K. Sugahara, Chief Engineer of the Kobe and of some street railroads soon to be built in Japan, were invited to address the convention, and Mr. Sugahara spoke in part as follows: Japan is achieving a great deal in her material progress and is striving to accomplish in rapid succession what she learns from abroad. Your venerable Commodore Perry opened our gate toward Western civilization some 44 years ago, and to-day your discoveries and inventions lead us hand in hand to the march of material civilization, for which we are greatly indebted to your people and country. The progress of our street railroads is very slow, and they are in a primitive stage as yet. For instance, they are only about 60 miles in length, and most of them depend on horse power, except the Kioto and Nagoya electric lines. Several electric railroads, however, have been projected in different cities and towns throughout the country.* We are firm in our belief that in the near future Japan will be found a network of electric street railroads. We have about 40,000 of Jinrikisha and 90,000 of wagons drawn by men for the means of transportation in Tokio, which greatly interferes with the progress of street railroads. Notwithstanding these difficulties, Tokio horse car railroad companies pay on the capital invested 30 per cent. dividends annually, and our steam road company 13 per cent. We have no doubt that to build street railroads in Tokio is one of the most promising enterprises. It is my great desire that our country shall progress in such a degree that when any of you shall come to Tokio, you may go to any place in the city by street cars, not by Jinrikisha, and that our country may be seen as one of the industrial countries of the world.

The paper on "Inspection and Testing of Motors and Car Equipments by Street Railway Companies," by Mr. Frederick D. Perkins, Elec. Eng. Toledo Traction Company, Ohio, was then read. Further reference to this paper will be made in a later issue.

Friday Session.

The paper on "Cost of Electric Power for Street Railways at Switchboard, both Steam and Water," by R. W. Conant, Electrical Engineer Boston Elevated Railroad Company, Boston, Mass., was first taken up. This will also be printed in a subsequent issue of the Railroad Gazette.

Mr. McCormack, Brooklyn, gave a brief report of the Committee on Standard Rules for Government of Conductors and Motormen. He asked that the committee be continued for another year, and that $200 be given to pay expenses of printing the rules and mailing to the members for their suggestions and criticisms.

Before the meeting adjourned, Mr. C. S. Sergeant, the newly-elected President, in accepting the office, referred to the work and aims of the Association.

Exhibits at American Street Railway Association Meeting

The Adams & Westlake Co., Chicago.—Model section of a car fitted with electric light fixtures of different patterns and with brass fittings made by the company. A contra-twist double door hanger was fitted to the doors at one end of this car. The type "A" ball-bearing ratchet brake handle and a large variety of car curtains were also shown.

The Albany Lubricating Compound & Cup Co., Albany, N. Y.—Samples of Albany lubricating compounds and Albany grease for street railroads.

The American Brake Shoe Co., Chicago.—See exhibit of William F. Ellis.

American Mason Safety Tread Co., 40 Water street, Boston.—Samples of the Mason unwearable non-slipping treads were shown on platforms and running boards of a street car.

American Wheelock Engine Co., Worcester, Mass.—Full-sized valve gear for steam engines of high duty was shown in section, so that its principles could be readily understood.

Albert & J. M. Anderson Mfg. Co., 289 A street, South Boston, Mass.—Aetna railroad insulators, line materials for electric roads, knife switches from 15 to 10,000 amperes, Ajax quick brake switches and other apparatus used in electric power work.

The Ashton Valve Co., 271 Franklin street, Boston.—Samples of the Ashton hydraulic relief valve, snifting valve, Ashton lock-up safety valves; also Ashton pressure and vacuum gages and other recording instruments for locomotives and engines.

Charles Bacon, Boston, Mass.—Samples of steel and lead woven treads for steam and electric cars, made by the Clinton Wire Cloth Co. of Clinton, Mass.

The Barney & Smith Car Co., Dayton, O.—Full-sized car trucks for electric and steam roads. Special attention was called to the class G motor truck, on which letters patent were granted May 4, 1897. This truck was designed for simplicity, strength and durability. It is made of wrought steel, and all castings subject to strain are malleable. One of the features of this truck is the ease with which the wheels and axles can be removed. The class H double motor truck, designed to set low and having many features showing recent improvements, and other patterns of trucks of standard design, were also shown.

Bemis Car Box Co., Springfield, Mass.—Different types of trucks for street cars.

Beverly Machine Works, Beverly, Mass.—The Beverly ratchet clutch vertical brake wheel for vestibule cars. One of the desirable features of this brake wheel is that it takes up but 9 in. on the platform. The clutches are made of cast steel and the teeth machine cut.

Bibber-White Co., 49 Federal street, Boston.—Standard "B-W" material, many samples of ears and insulators, a protected rail bond, lock washers and general street railroad supplies.

Billings & Spencer Co., Hartford, Conn.—Commutator segments and other general supplies.

R. Bliss Mfg. Co., Pawtucket, R. I.—Full-sized models of Woods' patent safety gate for car platforms, finished in brass and bronze.

Boston Artificial Leather Co., Boston.—A number of car seats were shown covered with Moroccoline. This has a hard, flexible surface, which cannot be scratched or rubbed off. Oil or grease will not affect this surface and stains can be easily removed. Moroccoline costs about one-third as much as hand-buffed upholstery leather, which it imitates.

Boardman-Tucker Co., Boston.—A number of telephones designed especially for street and steam railroad work, connected up for the use of those interested.

Brady Metal Co., 100 Broadway, New York.—Brass castings, bearings, trolley wheels and other general supplies for street railroads.

J. G. Brill Co., Philadelphia.—This company showed a car of the Metropolitan Street Railroad Co., New York, mounted on Brill's Eureka maximum traction tracks. This car was also equipped with Brill's angle iron bumpers and the Brill ratchet brake handle. Other exhibits included the Perfect truck, No. 21 E truck, with forged axle box frame; Perfect truck No. 27, Brill's 27 D. and No. 22 Eureka maximum traction pivotal trucks and electric sweeper. A new design of combination summer and winter car was shown on a track outside the hall.

The E. T. Burrowes Co., Portland, Me.—Samples of Burrowes' car curtain fixtures and car curtain materials.

Harold P. Brown, New York.—Samples of the Edison plastic rail bond.

Cambria Iron Co., Johnstown, Pa.—Sections of Tee and girder rails of varying weights and patterns, angle plates and track material for both steam and street railroads.

L. C. Chase & Co., Boston.—Samples of Goat Brand car plush made by the Sanford mills. The company has recently sent a large order of this well-known plush to Japan and a sample of the pattern to be used in a car now being built by the Nippon Railroad for the Mikado of Japan, was shown.

The Chicago Rheostat Co., Chicago.—The "nomenclature" motor rheostat for 125, 250 and 500-volt circuits.

Christensen Engineering Co., Milwaukee, Wis.—A full working apparatus on the Christensen principle and arranged for three weights of motor cars was shown. This apparatus was designed to automatically restore the pressure in the cylinders by means of an electric motor when this pressure has been reduced by applying brakes.

Coleman Farebox Co., Tottenham, Ont.—Three sizes of the Coleman patent portable farebox.

The Columbia Machine Works, Brooklyn, N. Y.—Assembled segments of the Westinghouse No. 38, 12 A., 12 and 3 machines; General Electric 800 and 1,000 machines; W. P. 50 form 7, 1 and 4 machines; Steel motors C and C 3; trolley wheels, trolley harps, trolley poles, gears, pinions, splicing ears, straight ears, commutator bars of various styles, controller parts and other supplies.

Composite Brake Shoe Co., 620 Atlantic avenue, Boston.—Samples of the "composite" brake shoe complete; also parts showing the principles of construction.

Consolidated Car Fender Co., Providence, R. I.—Full size Providence fender for street cars.

Consolidated Car Heating Co., Albany.—Different types of electric heaters for street cars.

Continuous Rail Joint Co. of America, Newark, N. J.—See exhibit of William F. Ellis.

Corning Brake Shoe Co., Buffalo, N. Y.—Corning brake shoes, also parts showing the principle of construction. Shoes that had been used until worn out were also shown.

Creaghead Engineering Co., Cincinnati, O.—Overhead line apparatus, Bourbon strain insulators, Jandus long-burning arc lamps and Creaghead flexible brackets.

Dearborn Drug & Chemical Works, Warren, Pa.—A complete line of lubricants and oils for bearings and other uses on street railroads.

E. F. de Witt & Co., Lansingburgh, N. Y.—The de Witt "common-sense" box shown in operation.

Diamond State Iron Company, Wilmington, Del.—The Churchill rail joint for all sizes and patterns of T and girder rails was shown; also the Diamond spike of special design for all types of rails.

Dilworth, Porter & Co., Ltd., Pittsburgh.—See exhibit by William F. Ellis.

Joseph Dixon Crucible Co., Jersey City, N. J.—Samples of pure flake graphite and commutator lubricating compounds, graphite paint for trucks and graphited wood grease for bearings.

The Duff Mfg. Co., Allegheny, Pa.—Lever, track and oil well jacks; also automatic lowering and trip jacks.

The Duplex Car Co., 253 Broadway, New York.—A full size duplex car, similar to the one described and illustrated in our issue of Oct. 15, 1897. This car is designed for summer and winter use, and can be changed from a closed to an open car, either partially or wholly, in a few minutes. It takes the place of a double equipment, and is designed to be a means of saving in first cost and maintenance of cars, car sheds and insurance.

William F. Ellis, 178 Devonshire street, Boston.—"Diamond S" brake shoe, made by the Ramapo Iron Works, Hillburn, N. Y.; the Goldie perfect point spike and claw tie plate, made by Dilworth, Porter & Co., Ltd., Pittsburgh, Pa.; joints for Tee and girder rails made by the Continuous Rail Joint Co. of America, Newark, N. J.; Harvey grip and U. S. rolled steel thread bolts, made by J. H. Sternbergh & Son, Reading, Pa.

W. R. Evans.—Model of illuminated car sign.

Fairbanks, Morse & Co., Chicago.—Four sizes of jacks.

Falk Mfg. Co., Milwaukee, Wis.—Welded joints shown in section and as finished joints.

Gold Street Car Heating Co., New York.—A variety of electric heaters for street cars and house heating; large heater for waiting room, through the hot coils of which a current of air is driven by means of a small Sturtevant fan.

H. Gore & Co., 54 Kilby street, Boston.—Samples of connecting links and rail joints; also supports for tracks and other apparatus. This apparatus is included in what is termed J. D. Reed's substructural support and swinger construction.

General Electric Co., Schenectady, N. Y.—At the end of the hall an immense globe was erected by the General Electric Co. to serve as an exhibit. The globe, representing the earth, was built up of papier mache upon a framework of wood, and rested upon a black pedestal. The continents and oceans were accurately and tastily painted on the globe, which was built in 54 distinct sections to a scale of 312 miles to 12 in., was 25 ft. 2 in. in diameter, and weighed three tons. Dotted over the globe were small incandescent lamps of different colors, each lamp representing the location of some city in which the General Electric Co. has some typical installation; 400 lamps were used. These did not represent by any means all of the important installations. Had the relatively correct number of lamps been used, New England on this globe would have been covered with closely set lamps, 30 to 40 tiers high from the surface. The interior was richly upholstered. The air was kept cool by revolving electric fans, and the lighting of the interior was all indirect. A small track occupied the plane of the Ecliptic, on which once a minute traveled a miniature trolley car, labeled "World Circuit." The globe will remain in place during the Mechanics' Fair, and will then be taken down and sent to Paris, where it will occupy a prominent position in the Electrical Building at the Exposition of 1900. A model plant to show the practical working of the Thomson car recording meter, consisting of a G. E. 800 motor, an R-11 controller and the necessary resistances, the car motor, fuse and a form M circuit breaker, was shown near the globe. The load was applied to the motor by means of a brake working on a pulley keyed to the armature shaft. Behind this plant was an instrument board, on which were shown the latest types of astatic volt and ampere meters, inclined coil switchboard and portable instruments, all grouped around a type M station recording wattmeter reading to 8,000 amperes. Above the instrument board hung an illuminated sign, setting forth the sales of the company, which up to Sept. 1, 1898, amounted to 2,285 railroad generators, aggregating 423,-101 h. p.; 52,841 railroad motors, aggregating 1,270,865 h. p.; and 500,000 series parallel controllers. The Convention Hall was lighted from G. E. inclosed arc lamps.

Ham Sand Box Co., Troy, N. Y.—New design of the Ham sand box, the modifications from previous designs being in the arrangement of the web-shaped block, by which the sand is economically drawn out of the box and dropped on the track. The sand spout is not connected with the sand chamber.

Hanna Solid Oil Co., 183 Dearborn street, Chicago.—Samples of the Hanna solid oil for car journals.

* See Railroad Gazette, May 20, 1898, p. 362, for complete description of proposed lines.

Hanna Solid Oil Company, 183 Dearborn street, Chicago.—Samples of solid lubricant for steam and street railroads.

Hempden Car Wheel Grinding Co., Springfield, Mass.—Car wheel grinder for rounding flattened car wheels, shown in operation.

Albert Herrick, 120 Liberty street, New York.—Exhibit of complete apparatus to be used in the Herrick system of electric inspection and testing for street railroads. These instruments are made by the Western Instrument Co., and are magnetically shielded, and include one ohmeter, with a scale reading the insulation in megohms direct. This apparatus is designed to make complete tests on all electric railroad machinery and apparatus.

Heywood Bros. & Wakefield Co., 174 Portland street, Boston.—Seats with reversible backs and sliding bases of different styles, covered with rattan and with imitation leather.

The Hipwood-Barrett Car & Vehicle Fender Co., 322 Exchange Building, Boston.—A new patent car fender, designed to be thrown flush with the track by the motorman, and arranged so that the person picked up will be held on the fender without danger of being thrown off.

The Incandescent Electric Light Manipulator & Cleaner Co., Hyde Park, Mass.—Manipulators of different lengths for removing incandescent electric lamps from walls. The pole can be telescoped to suit different heights, and is equally applicable to street lights.

H. W. Johns Mfg. Co., New York City.—"Electrotherm" car heaters of different types placed under car seats; also full line of insulating material for line work.

The Johnson Co., Lorain, O.—Among its exhibit was a 30-h. p. closed motor, with field coils and armatures shown separately ɐzıs ɹnɟ ɐ pun Dupont truck, style "C," with a spring base from 12 to 18 ft., designed for any style of motor or trailer cars. These trucks have an extended spring base design, to give the minimum amount of oscillation.

The Johnson Co. of Johnstown, Pa.—Four types of equipments, namely, 30, 35, 45 and 40-h. p. motors, some of which were mounted on Dupont trucks, made by the Johnson Co. Also, the latest type of controllers for use with two, three and four-motor equipments. It is stated that the controllers made by the Johnson Co. for three and four-motor equipments are the only ones for this class of work on the market. All the parts which constitute a complete equipment will also be shown at the Johnson exhibit.

Keystone Electrical Instrument Co., Ninth street and Montgomery avenue, Philadelphia.—A complete exhibit of portable voltmeters, portable milliammeter, illuminated dial switchboard instruments, switchboard potential and current indicators and other switchboard portable apparatus and measuring instruments.

Knitted Mattress Co., Canton Junction, Mass.—A large variety of samples of knitted padding for car seats, cushions and mattresses.

Laconia Car Co., Laconia, N. H.—Two cars, one complete and one in skeleton, of the type in use on the Boston street railroads; also, Gregg's patent steam trap.

J. A. Lakin & Co., Westfield, Mass.—A group of standard railroad signals specially adapted for street railroad work. Lighting arresters, placed on lighting circuit, were also shown.

Lap Joint Railway Track Co., Bowling Green Building, New York.—Models and sections of a lap joint for railroad tracks, designed for durability, smoothness, strength, increased wearing capacity and simplicity.

McCardell, West & Co., Trenton, N. J.—The Trenton trolley wagon. This wagon has a platform whereby the repairs of the line can be made without interfering with the running of the cars.

J. H. McGrady, 308 Atlantic avenue, Boston.—Swift's illuminated reversible signs for cars. By this patent, granted in 1895, the signs on the four sides of the cars can be reversed with a simple movement of a controlling lever.

The McGuire Mfg. Co., Chicago.—"Columbia" car heaters; full size No. 28 pivotal truck and standard "A 1" suspension truck; combination snow plough and sweeper.

Meaker Mfg. Co., Chicago.—New fare registers, showing letter symbols in combination with figures, for the purpose of making a totalizer which can be read only by the person knowing the combination. Other types of registers were also shown.

Mica Insulator Co., 218 Water street, New York.—Samples of mica insulators for commutator segments and other insulating purposes; also micanite cloth.

Michigan Mfg. Co., Ypsilanti, Mich.—Sweet's track drill, the rear end of the shaft being fitted with Sweet's bearing. These tools can be locked over a rail from either the inside or the outside. The height is 32 in., length over all 29, diameter of balance wheels 25, and weight complete 160 lbs.

E. H. Morgan, Greenfield, Mass.—A Kilbourn sand feeder for street cars intended to work with sand containing stones that would pass through as large as a 2-in. opening. The sand is forced out by a rubber diaphragm, which is worked by an iron peg projecting from the floor of a car platform.

Elmer P. Morris, 15 Cortlandt street, New York.—Overhead line material and general supplies, made by the following companies: Electric Railway Equipment Co., Simonds Mfg. Co., Garton-Daniells Electric Co., Keystone Electrical Instrument Co., Sterling Arc Lamp Co., Wheeler Reflector Co., and McGuire Mfg. Co. Forsyth car curtain fixtures and Monarch insulating paint were also included in the exhibit.

F. H. Newcomb, 136 Flatbush avenue, Brooklyn.—Samples of uniform caps for railroad employees.

New Haven Car Register Co., New Haven, Conn.—The special '97 model, which registers to 1,000 on trip trains and to 100,000 on totalizing train; transfer registers of different patterns.

New York Car Wheel Works, New York.—Special cold-rolled axles, calibered to $\frac{3}{1000}$ in., entire length. Machine wheels for both light and heavy electric service, and section of tread and flange showing depth of chill.

New York Switch & Crossing Co., Hoboken, N. J.—An electric switch of recent design, shown in operation at the corner of Washington and Boylston streets, in Brookline, Mass.

A. O. Norton, Boston, Mass.—A complete line of light and heavy ratchet and screw jacks.

R. D. Nuttall Co., Pittsburgh, Pa.—Gears, pinions, trolleys and general supplies for electric railroads.

Ohio Brass Co., Mansfield, O.—Large and complete exhibit of bearings, insulators, overhead line material and general street railroad supplies.

Pantasote Co., New York.—A well-arranged exhibit of Pantasote, a substitute for leather for upholstery and head linings.

Geo. A. Parmenter, Cambridgeport, Mass.—Parmenter life guards attached to model of a section of a car body. Two types were shown; one extending in front of the car, being released by a slight pressure of motorman's knee, causing the fender to drop so that the forward part is in contact with the street paving. The other form, placed on the trucks, drop in a somewhat similar way, being released by a light bar hung horizontally within about nine inches of the ground, capable of swinging by a slight pressure. It is intended that the person coming in contact with and moving this bar will release a catch which causes the fender to drop in a manner very similar to the other style, as described.

The Pearson Jack Company, 64 Federal street, Boston.—Pearson car lifting jacks of different sizes, shown working both upright and at an angle. The Pearson jacks are now in practical use on more than 75 steam roads and a large number of street roads.

Peckham Motor Truck & Wheel Co., New York City.—The exhibit of this company occupied several hundred square feet in the ground floor of Exhibition Hall, and included all the recent designs of the Peckham truck, including the following: No. 17, designed for steam railroad service; No. 7 D (single), double cushioned No. 14 and the Extra Strong No. 14, the No. 14 B, a short wheel base truck, the No. 14 C, Maximum Traction truck with double cushioned center bearings, the No. 14 D triple cushioned swing bolster, and the No. 15 swing interurban or elevated service.

Pennsylvania Steel Co., Steelton, Pa.—Samples of special steel work on Boston roads.

The Pettingell-Andrews Co., Boston.—Samples of the "Brilliant" metal polishers; Kilbourn sand feeder; standard railroad switch; Okonite wire and cables; O. K. wire; M. C. Allen's overhead supplies.

Q & C Co., Chicago.—Samples of track and car jack rail sawing machines and the Q & C Company's drills.

Rochester Car Wheel Works, Rochester, N. Y.—Chilled cast iron car wheels of a number of different patterns.

Rochester Hose Bridge Co., Rochester, N. Y.—Full-sized model of the Rochester hose bridge.

Russell Mfg. Co., Chicago.—Full size device, known as "trolley harp No. 2," for use on curves of electric railroads. This pattern is similar to the device "No. 1," made by the same company, which was made for taking crossings at a rapid speed. In both of these devices a spring acts as a cushion, giving the wheel a close and sure contact with the wire.

Safety Third Rail Electric Co., Temple Court, New York.—A model track about 100 ft. long, on which was run a small electric car, equipped with the apparatus for running on the safety third rail system.

Samson Cordage Co., 115 Congress street, Boston.—Samples of window sash cords, bell cord couplings and cord hooks and snaps for car curtains.

Sanitary Engineering Co., 507 Girard Building, Philadelphia.—Patterns of the Botfield noiseless ventilated manhole covers.

Charles Scott Spring Co., Philadelphia, Pa.—Large variety of springs for steam and electric cars.

Shawmut Fuse Wire Co., Boston.—Samples of the round type of T-H railroad links and the flat type of Shawmut fuse links. Also air-tight fuses for electric car heaters.

Stanley & Miles, Whitman, Mass.—A new safety emergency brake, which can be applied for an emergency stop by a simple pressure on the brake handle. All parts are easily accessible. A brake can be fitted to any car without taking the same out of service.

The John Stephenson Co., of New York.—Finely-built model of a Stephenson car as used on the Broadway line, New York. This car was mounted on excellent models of Peckham trucks.

Sterling Supply & Mfg. Co., 141 East Twenty-fifth street, New York.—Different styles of Sterling fare registers and fixtures and connections for registers; the Sterling safety brake and safety street car fenders, strain insulators and suspensions, conductors' badges and counters.

J. H. Sternbergh & Son, Reading, Pa.—See exhibit of William F. Ellis.

D. D. Sweet, Springfield, Mass.—Full-sized model of Sweet's car wheel grinder for truing-up flat wheels.

The Taylor Electric Truck Co., Troy, N. Y.—Showed one of its latest improved single trucks, with 7-ft. wheel base and with 33-in. wheels; one of its latest improved single trucks with extension truss for long, open cars; one extra heavy single truck, with 8-ft. wheel base; one set of the Empire State radial trucks; also, a set of new design swing motion double trucks.

John J. Tonkin, New York.—Two large internally fired water tube boilers of comparatively new design, and having a corrugated combustion chamber.

Universal Car Bearing Co., 11 Broadway, New York.—Models of Universal car bearing.

J. B. Van Wagener, Pittsburgh, Pa.—Different types and sizes of the Duquesne patent forged steel axle gear wheels and pinions for electric cars.

The Walker Co., Cleveland, O.—Section of Walker underground conduit system, Walker No. 15 L railroad motor, Walker No. 15 L motor, open to show construction, Walker No. 33 S motor mounted, Walker No. 33 S motor open, set of 33 S armatures in various stages of construction, set of 33 S motor parts, Walker standard trolley, Walker switchboard panels with wattmeter and "S" controllers.

The Watson-Stillman Co., 204 East Forty-third street, New York.—The principal exhibit of this company was hydraulic jacks, new designs of different sizes being shown. A portable hydraulic beam punch, designed for punching a 1-in. hole in 1-in. iron, and weighing complete 645 lbs., with a 9-in. jaw opening; two hydraulic rail benders, one for Tee and one for girder rails, and a portable motor life of 22-in. stroke, used by the Metropolitan Street Railroad Co. of New York, were also exhibited.

Weber Railway Joint Mfg. Co., Cotton Exchange Building, New York.—A number of samples of Weber joints for girder and Tee rails; also shoe angles, fish plates and specimens of the wood filler used in connection with Weber joints.

The Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.—The following are the more important exhibits made by this company: A 2½-h. p. air pump and motor, 6-A C and 6-D C fan motors, a 15-k. w. auto-converter for currents from 80 to 4,000 volts, one 2,000-ampere two-way switch, a 50-k. w. 60,000-volt transformer, transformer switchboard motors, circuit breakers, choke coil, line arresters, converters and switches. The most interesting exhibit of this company was an illuminated sign, "The Name of Westinghouse Is a Guarantee," attached to each brass letter of which was a small wire from the large static transformers, which conducted a high tension current to these letters, making electric flashes creep in all directions over the glass on which they were placed.

William Wharton, Jr., & Co., Philadelphia, Pa.—This company showed their manganese steel girder and manganese steel T rail work, with some improvements in the details of construction which have been made in the past year; also samples of special work.

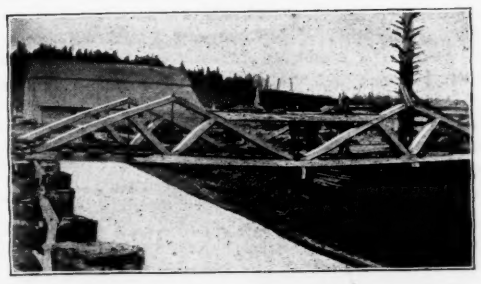
Wheel Truing Brake Co., Detroit, Mich.—New design of the wheel truing brake shoe arranged to be placed on the brake beam in place of the commonly used shoe until the uneven wheel is worn true. The wearing surface of the shoe is made of a secret compound, the principal ingredient of which is emery.

The Williams Truss Rail Joint Co., Boston and Chicago.—Models and full-sized section of rail, showing principle of the Williams truss rail joint, which is composed of five parts and is arranged to be used without bolts or nuts, designed on the truss bridge principle, special emphasis being laid on the ease with which it can be placed or removed from the rail.

Wilson, Thomson & Co., Brooklyn.—This company showed a number of their trolley pole catchers in operation.

Charles N. Wood, 31 State street, Boston.—Different types of International double registers.

R. Woodman Mfg. & Supply Co., 63 Oliver street, Boston.—Ticket punches, badges and checks, speed indicator, the Easy car pusher and other similar supplies.



A Highway Bridge at Aberdeen, Wash.

Criticism or comment on this design is quite superfluous.

New York Street Railroad Association.

The sixteenth annual convention of the Street Railway Association of the State of New York was held at the Manhattan Beach Hotel, Manhattan Beach, N. Y., Sept. 13 and 14. The convention was called to order at 11:20 o'clock a. m. Tuesday, with President Rogers in the chair.

The courtesies of the convention were extended to Mr. K. Sugahara, Chief Engineer of the Kobe Railroad of Japan, and of some electric railroads soon to be built in that country, who is visiting the United States for the purpose of investigating our methods of operating and building both steam and street railroads.

The President, in his adress, outlined the work of the committees, especially as to legislation, during the past year, and also spoke of the splendid transportation facilities of the street railroads of the Boroughs of Manhattan and Brooklyn, congratulating the Metropolitan Street Railway Company of the former borough for the remarkably quick and business-like way in which it is changing its motive power on certain lines from horses to electricity.

The report of the Executive Committee, which consisted of Messrs. G. Tracy Rogers, Henry A. Robinson, Secretary; H. H. Vreeland, John W. McNamara, Henry M. Watson and Clinton L. Rossiter, was read and followed by a report of the Treasurer.

The first paper to be read was that of Mr. H. Milton Kennedy, G. P. A., B. H. R. R., on "Methods for Developing New Traffic on Street Railroads." Mr. Kennedy enjoys the distinction of being the only General Passenger Agent of a street railroad in this country, and from the excellent work done by this special department, as set forth in the paper, one can readily see the experiment has proved a paying one to the Brooklyn Heights road. The principal duty of the General Passenger Agent is to assist in developing pleasure resorts at different termini and educating the public, by attractive advertising and other ingenious inducements, to patronize these resorts. As an instance of the success of these undertakings, Mr. Kennedy cited the case of Bergen Beach, which until three years ago was nothing but a small piece of wooded land, about a mile distant from the terminus of one of the lines of the Brooklyn Heights. Some capitalists were induced to develop this into an amusement center. The tracks of the road were extended to that point, and to-day it is one of the best paying lines of the company. All the advertising (which in the case of the Brooklyn Heights is large), as well as the special parlor and illuminated car and picnic business, also comes under the jurisdiction of the General Passenger Agent.

The paper was well discussed. Mr. H. H. Vreeland, President of the Metropolitan Street Railroad, New York City, stated that, while the road in which he was directly interested did not pay any attention to special traffic, having all it can do to provide enough cars to handle regular business, yet some companies in which he acts in an advisory capacity had found it necessary to try and develop excursion business. It was his opinion that an operating railroad officer cannot properly take care of his legitimate business, that of providing for the comfort and safety of the regular traveling public, if forced to give his attention to developing special traffic; hence, the idea of placing the excursion business in the hands of a special agent was a good one. Mr. Vreeland, however, was of the opinion that too much attention can be paid to special traffic, to the detriment of regular business, and gave some illustrations from actual experiences.

The second paper was "Signal Systems on Single Track Roads," by Mr. H. S. Cooper, Schenectady, N. Y. The discussion was short.

Mr. H. M. Fenner, Dunkirk & Fredonia (N. Y.) Railroad, read a paper on "By-Product of Power Stations," after which the convention adjourned until 3 p. m. The following papers were also read and discussed: "Track Bonding," by Harold P. Brown; "Rails; Their Construction from a Scientific Standpoint; Results of Chemical Analysis," by Mr. Moxam; "The Relation Between the People and the Street Railways," by T. J. Little, Metropolitan Street Railroad (N. Y.); "Electric Railways as an Auxiliary to Coast Defense," by William J. Clark, New York; "Individual Fare Boxes; Are They Practicable?" by T. J. Nicholl, New York, and "Track Construction," by D. F. Carver, B. H. R. R.

At Wednesday morning's session, a vote of thanks was tendered the officials of the Brooklyn street railroads for the many courtesies extended to those in attendance at the convention.

Ithaca, N. Y., was decided on as the place for holding the next convention.

The following officers were elected: President, Mr. G. Tracy Rogers, President Binghamton R.R.; First Vice-President, Mr. W. Caryl Ely, President Buffalo & Niagara Falls Electric R.R.; Second Vice-President, Mr. Albert L. Johnson, President Nassau Electric R.R., and Secretary and Treasurer, Henry A. Robinson.

The entertainment part of the programme was arranged by the Local Committee, Messrs. Clinton L. Rossiter, President Brooklyn Heights R. R.; Albert L. Johnson, President Nassau Electric R. R., and John L. Hein, President Coney Island & Brooklyn

R. R. On Tuesday evening the members and guests were entertained by an exhibition of Paine's fireworks, "The Fall of Manila," followed by the annual banquet. Wednesday morning special parlor cars of the Brooklyn roads carried those in attendance at the convention to the Navy Yard, after which they boarded a steamer at the bridge dock for an excursion down New York harbor, up the Hudson River to Spuyten Duyvil, and down the East River. A button issued by the Association permitted the wearer to ride free on the street cars of Brooklyn.

Exhibits.

Bibber-White Co., Boston, Mass.—Full line of overhead line materials and general electrical supplies.

Composite Brake Shoe Co., Boston, Mass.—Samples of the composite (cork insertion) brake shoes for street railroad cars, some of which have been in constant service for several months.

Falk Mfg. Co., Chicago.—A full size Auto-Motoneer.

Hale & Kilburn Mfg. Co., Philadelphia, Pa.—Three full size Walkover seats for street cars, one upholstered in plush and two in rattan.

Indestructible Road-Bed Construction Co., 81 New street, New York.—Full size model of the Hevner system of making road-beds.

New Haven Car Register Co., New Haven, Conn.—Several styles of New Haven car fare registers.

George A. Parmenter & Co., Cambridgeport, Mass.—Full size models of the Parmenter life guards, attached to a section of the front end of a street car.

Rooke Register Co., Peoria, Ill.—Samples of the Rooke register for street car fares.

Safety Third Rail Electric Co., Temple Court, New York City.—Model track and car, showing method of operating electric railroads by the Safety third rail system.

Standard Fireproofing Co., Perth Amboy, N. J.—Samples of the Standard fireproof conduit.

Wilson, Thomson & Co., Brooklyn, N. Y.—Model of the Wilson patent trolley pole catcher and reel.

Railroad Department of the Y. M. C. A.

The elevating influence of the Young Men's Christian Association has been recognized by many railroads in this country, as shown by the money expended annually for the support of railroad branches of the Association. Last year this amounted to over $150,000. The money thus given to sustain the work has, according to the testimony of the officials, been a paying investment, and the constantly increasing demand for more efficient and reliable railroad employees has made the work almost imperative in many cases. From the Railroad Department of the Y. M. C. A., the central office of which is at 3 West Twenty-ninth street, New York City, and from an address by Mr. C. J. Hicks, General Railroad Secretary, before the International Conference held at Basle, Switzerland, in July last, some accurate figures have been obtained.

In the United States, at the end of May last, there were 130 railroad associations and departments, 145 railroad secretaries and assistants, 3,714 paying members and a much larger number using the rooms, which are always open to the employees; 3,817 members serving on committees, and 54 associations which occupy buildings either owned by the Association, or placed at their service by the railroad management; 13,318 total average daily attendance at the rooms in 107 associations, and 92 libraries containing 66,265 volumes. During the last calendar year, 110 associations paid for current expenses $284,255. Of this amount about 25 per cent. was contributed by employees and the balance by the railroad companies. In 95 of the associations 318,034 baths were taken, and 12,948 visits to the sick and injured men were made by the secretaries and committees in 92 associations.

The large and steadily increasing fund received annually from corporate support is practically an endowment. This fund now amounts to $150,000. Large sums are being expended for buildings and permanent equipment. Fifty-two associations occupy entire buildings and these have generally been provided at the joint expense of the railroad companies and the railroad men, the cost ranging from $1,500 to $250,000.

It is gratifying to observe that the associations are run on a business basis, and almost without an exception the work is well organized. On this latter point it is worthy of note that on some railroads the management encourages the Association to look into the needs of the employees at different points on the road. If it is found that reading, bath and rest rooms should be provided, an estimate is made of the approximate expense, and in many cases the railroad company shares largely in the cost of putting up the buildings and providing them with the necessary appurtenances. In a recent case where such a report concerning 32 division points was submitted to the President of the Atchison, Topeka & Santa Fe Railroad he selected four of the most needy places for immediate organization, and for three of these he agreed that the company would give $3 for every dollar contributed by the railroad members and citizens toward $10,000 buildings. The money for these three buildings has all been secured, and the buildings are to be erected at once. A similar report on the Grand Trunk, prepared at the request of its General Manager, was submitted by him to the Board of Directors in London. After full consideration a liberal annual appropriation was authorized to aid in establishing railroad associations. Similar reports have been prepared for six of the largest railroads in North America, and other roads besides these have asked for such reports from the associations.

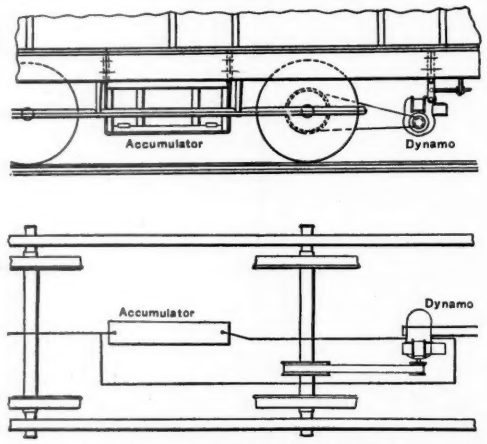
All the general work is directed by a railroad committee of the International Committee at New York, consisting of C. F. Cox, John J. McCook and Dr. John P. Munn. Six traveling railroad secretaries are employed under the direction of this committee, who devote their entire time to this department. While the work now centers for the most part about the New England and Middle Atlantic states it is being gradually extended both West and South. It may be noted, however, that there is but one railroad branch west of Denver. This is at Pocatello, Idaho, and there are but three branches in the states south of Kentucky. One of these is at Atlanta, Ga.; another at Selma, Ala., and the third at Meridian, Miss.

As a result of conversations with secretaries engaged in the railroad department, it seems that more might be done in the line of practical lectures on railroad topics. It appears that the social features, the work included in the athletic departments, as well as the religious work, has been well carried out, but it may be questioned if the educational part of the work, such as providing facilities by lectures whereby the members can obtain a broad knowledge of railroading, has received its share of attention. We have been led to this conclusion from the statements of the secretaries themselves, but it is possible that this feature also has received relatively as much attention in many of the branches as the other departments of work to which we have referred, and further inquiry might lead to a different conclusion.

Electric Lighting of English Railroad Trains.

In Europe the use of electric lights in passenger cars is becoming very common, as the reader will recall from recent statements printed in these columns. Among the important experiments are those of the Midland Railway of England. That company some years ago began the use of one machine in the guard's van for a complete train, a system now employed by one or two other English railroads. The Midland experiments were abandoned for the time. The question of convenience is said to have weighed with the experimenters, rather than cost. The Midland has about 3,800 coaches and vans, and the officials consider that it is more economical to furnish 380 dynamos, arranged in the guard's van, than to fit a separate machine to each of the 3,800 below board.

The London, Brighton & South Coast employs a dynamo and accumulators, the apparatus being placed in the guard's compartment. This has been at work since 1883. Belts are led from the far axle



The Stone Electric Lighting Apparatus.

of the guard's van to the dynamo. As soon as the train moves the dynamo armature begins to turn. Attached to the dynamo by means of a small strap is a centrifugal governor, and when the train attains any prearranged speed—say six miles an hour—the governor joins up an electro magnet, thereby putting the accumulators in circuit with the dynamo and causing the latter to commence charging the former. As the speed of the train increases the electromotive force of the dynamo rises and the governor gradually draws the brushes forward so as to prevent sparking at the commutator. As the speed of the train diminishes the reverse operation takes place, the brushes gradually returning toward their original position until down to the six miles an hour limit, when the governor breaks contact and the dynamo ceases to charge. The dynamo is fitted with double sets of brushes and works equally up or down; the direction of rotation of the governor determining which set shall be brought into use. In the dynamo circuit is a regulator so constructed that as the electromotive force in the dynamo circuit varies, more or less resistance is automatically inserted in, or removed from, the lamp circuit, thus maintaining the light practically constant.

When fully charged the accumulators will keep the light going for 10 hours without the aid of the dynamo. The accumulators have to be dismantled about every 20 months and thoroughly cleaned, and the positive plates require renewing at the end of about 3½ years. They have a capacity of 400 ampere hours.

The trains cost $1,948 each to equip. The working cost for maintenance and renewals for the twelve months ended Dec. 31, 1897, was $225.72 per train.

The company has three express and 38 suburban trains equipped with this system, or about 430 coaches in all. Mr. Houghton, superintendent of the electrical department, reports that it is estimated that about 15 per cent. more work is got out of these trains than from gas lighted trains, the electric light trains being always ready to run and not needing to be hauled to charging stations. The company has come to the conclusion that the self-contained system is best for all general purposes, the weight being evenly distributed over the whole train, and it appearing to promise economy.

The self-contained system referred to is the invention of Mr. A. B. Gill and is being introduced (or tried) on something like 80 different railroads in the United Kingdom and abroad. The system is exploited and the machinery manufactured by Messrs. Stone & Co. of Deptford, therefore the system is known as the Stone system. The Stone system began in 1895 on the London, Tillbury & Southend and it has since been experimented with on the Great Northern, Great Western, London & North Western, Great Northern of Ireland, South Eastern, London, Chatham & Dover, Furness, Barry, Caledonian, Great North of Scotland, North British and the London & South Western. There are already over 1,000 cars actually fitted, some of the lines having over 100 coaches equipped, including American type vestibule cars, corridor trains, royal saloon coaches, etc.

The two diagrams show the method as applied to ordinary coaches. From these it will be seen that the dynamo is suspended from the under frame of the carriage so that its pulley is at approximately the same level as the pulley on the axle, from which it is driven direct by a belt, and by which means it is claimed that none of the vibration or vertical motion of the axle is transmitted to it. When fitted to bogie coaches wider pulleys are provided to allow for lateral motion of bogie truck. However the speed of the train may vary, after a certain predetermined limit has been reached, the dynamo always runs at a uniform speed, and consequently always produces the same amount of current. This result is obtained by suspending the dynamo by one corner of its frame by means of an adjustable link in such a manner that the former is free to swing toward or away from the driving pulley on the axle. The suspending link is adjusted so that the driving belt draws the dynamo out of the diagonal position in which it would naturally hang, thus putting a definite tension on the belt just sufficient to absorb power equivalent to the amount of electricity required. It will thus be evident that when the pull on the belt (owing to the increase in speed of the train) exceeds the weight on the belt, due to the one-sided suspension of the dynamo, the latter will automatically be drawn toward the driving pulley on the axle, thus allowing the belt to slip, while the armature will continue to revolve at its normal speed. The suspending link being provided with an adjusting screw, allows the tension on the belt to be varied when required. A strong mechanical governor automatically makes connection between the dynamo and accumulator as long as the train is in motion; on slackening or stopping the lamps are supplied from the accumulator only. The accumulator being always in connection with the lamps causes the light to be steady, acting as a regulator to absorb any excess of current generated by the dynamo.

The various parts are lubricated from a large oil reservoir, the supply being controlled by a small lever automatically operated by the magnetism of the dynamo, which thus allows the oil to pass to the bearings as long as the train is in motion. When the train is stationary the small lever is released and no waste takes place. The reservoir only requires replenishing at long intervals. The whole of the working parts of the dynamo are enclosed in a casing which, although dust proof, is easily removable to afford access to the bearings, etc., when required.

A switch is provided in each carriage, and is arranged so that the lights can be either fully on or entirely cut off; or in cases where there are tunnels and the light is required in the daytime, half the lights only may be used. When the lamps are not alight the current generated by the dynamo is stored in the battery. On underground lines, where the light must be always burning, or in cases where it is an advantage that any of the lights may be separately extinguished without affecting the brilliancy of the remainder, the accumulator is duplicated and a special governor introduced, by means of which the accumulators are alternately charged, the accumulator, which, for the time being, is disconnected from the dynamos, supplying the current for the lamps. When the train is at rest the accumulators are automatically connected in parallel, thus not only equalizing the charge in them, but also greatly increasing the storage capacity.

The following figures show the results of experiments made in the presence of Prof. Slaby, director of the Berlin Royal Technical College and Profs. Hagen and Neesen of the German Patent Office, to demonstrate the extent to which the speed of a train might vary without increasing the speed and

output of the dynamo beyond its predetermined limit. (Rotation speeds are shown in revolutions per minute.)

Speed of pulley on axle of motor. (Representing axle of car.)	Equivalent speed of train in miles per hour (approximate).	Speed of dynamo.	Equivalent speed of dynamo if no slip were to take place.	Output of dynamo. Amperes.
100	12	500	500	0
138	16	690	690	2
150	18	750	750	6
168	20	840	840	14
185	22	885	925	17
205	24	915	1,025	20
225	27	915	1,125	20
250	30	915	1,250	20
375	45	915	1,875	20
400	48	915	2,000	20
450	54	915	2,250	20
500	60	915	2,500	20
600	72	915	3,000	20

The predetermined limit for speed of dynamo in these tests was 915 revs. per min., producing 20 amperes of current, which it will be noted was not exceeded.

Some idea of the power required is given in a report of laboratory tests by Prof. Capper of King's College, London, engineering laboratory. They showed that the power absorbed in generating the necessary amount of current for ordinary coaches, when running at normal speeds, is 0.6 H. P. At express speeds the power absorbed does not exceed 1.1 H. P. This is equivalent to an extra consumption of fuel both at normal and express speeds of ½ lb. per train mile, allowing 10 coaches to a train, or 1-20 lb. per coach per mile.

Southern Pacific Snow Sheds.

Mr. J. B. Robinson, Engineer of the Sacramento Division of the Southern Pacific, has found a way to prevent a peculiar damage to snow sheds, which has been an expensive annoyance on that road for a long time, and an officer of the road has sent us two photographs showing the way in which the difficulty was met. Fig. 1 shows an accumulation of snow on the top of a shed. Drifts of this kind, hanging over to one side, are common where from 30 to 35 ft. of snow falls in one winter. Frequently this load will be 8 ft. or 10 ft. thick, and will overhang the shed from 10 ft. to 12 ft. This overhanging part of the load is quite compact and in the spring will break off in a mass and fall against the side of the shed. Often it will be so solid and will become wedged between the shed and the drift on the ground in such a way that it will crush in the side of the shed.

Mr. Robinson, noticing the way in which the air currents will leave an empty space behind a tree, or post or other obstruction, concluded to try a barrier on the top of the roof, and the way in which he has done this is shown in Fig. 2. Planks 2 in. thick and

Fig. 1.

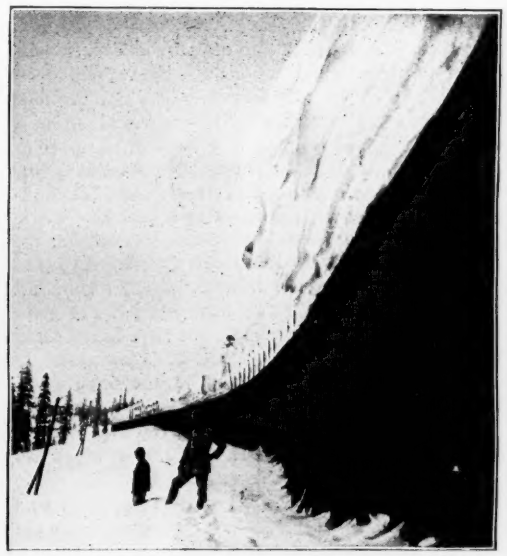


Fig. 2.

Southern Pacific Snow Sheds

1 ft. wide, and standing about 8 ft. to 10 ft. above the flat roof, prevent the accumulation of an overhanging mass and produce the effect shown in the engraving. At the right of the cut is an overhanging drift similar to that in Fig. 1; further along is a space fitted with the barriers, where no snow accumulated, and beyond this is another length showing the same overhang as in Fig. 1. The simplicity of this remedy will commend it to anyone having the same difficulty to contend with.

Working of Four-Track Roads.

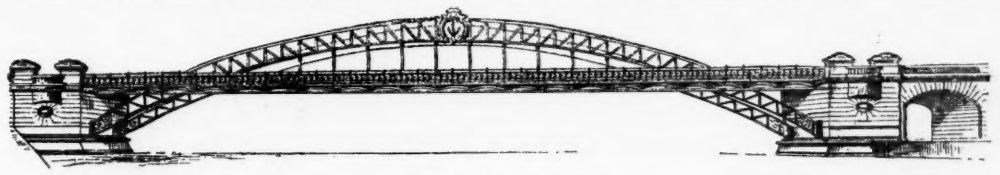
Perhaps, as England has had more experience than any other country of four-track roads, some account of our method of working them will not be out of place. The earliest instance of quadrupling a main line occurred on the main line of the North Western from London to Roade, about 50 miles, nearly a generation back. The work was undertaken largely as the result of a public outcry such as has recently occurred in Prussia. A great and sudden increase of traffic found the railroad companies, with signaling arrangements very far from perfect, and with continuous automatic brakes not yet in use, unprepared to meet it. The result was an epidemic of serious accidents, which led to a public demand that goods trains and passenger expresses should be run on separate lines. This demand the North Western set itself to meet. A new pair of lines, still known to the staff as the "slow road," was accordingly provided alongside the old pair, but the separation of goods from passenger traffic was never made. It is true the bulk of the goods travel on the "slow road" and most of the expresses on the "fast" lines; but all four lines have platforms at every station, are signaled and interlocked in the same manner, and the standard of construction and maintenance of the permanent way is precisely the same. The local passenger trains use either pair of metals indifferently, while at the hours when long distance passenger traffic is thickest, say from 9 to 11 in the morning and from 8 to 10 in the evening out of London, the expresses invade the slow lines; and in return during the night the goods trains take almost entire possession of the fast road.

On the Midland Railway, a line which traditionally places its goods before its passenger traffic, a different principle was adopted some years ago. Two new lines into London were built at an enormous cost for goods traffic only. They were built without any passenger stations on them and had, for many miles on end, no connection with the old lines alongside. But the lack of elasticity inherent in this system has been found to cause, more especially in the event of a breakdown, such serious inconvenience that, as I understand, in the case of the proposed new widenings the North Western plan will be adopted.

The Great Western main-line widening, which extends as far as Didcot, 53 miles from London, is precisely similar to that of the North Western, except that the new pair of roads are known not as the "slow" but the "relief"" lines. Other companies, as for instance the Great Northern and the South Western, have rather inclined to place together the two down and the two up roads, a method which of course makes it still easier to pass a train during its journey from the one line to the other and back again than where the two are separated by a line on which the traffic is traveling in the opposite direction. The Great Northern has introduced in some cases a further refinement, and has built separate signal boxes for the working of the up and the down roads respectively. But these are details, and broadly it may be said that our accepted practice is to make all four lines capable in all respects of dealing with all classes of traffic and to use them interchangeably as circumstances may require. The "working book," that is, assigns each train to one road or the other, but the signalman at any intermediate station can exercise his judgment and transfer a local passenger train, say, at Watford from the "fast" line to the "slow," if thereby a check to the Liverpool express or the Irish mail may be avoided. W. M. A.

A Railroad Arch Over the Seine.

The sketch herewith, reproduced from The Engineer (London), shows a bridge which the Western Railroad of France is building over the larger arm of the Seine in Paris, in the course of its prolongation of its existing tracks within that city. The bridge consists of a pair of open-web arched ribs. The span is 285 ft., the rise about 35 ft. and the head room above water 24 ft. From the lower chord of the horizontal truss depend the hangers which support the cross girders, and between these flat arches are turned.



A Steel Arch over the Seine.

Building Rolling Stock in Chile.

In order to protect home industry, the Chilean Government issued a decree in 1888 that all contracts for railroad material, the bids for which were not in excess of 10 per cent. over foreign offers, should be awarded to the manufacturers of the country. As a result, the firm of Lever, Murphy & Co., of Valparaiso, built the first locomotives in that country. After this start, the firms of Balfour, Lyons & Co., and Hardie & Co., Valparaiso, undertook the construction of freight cars, but manufactured only intermittently and the bulk was still imported.

In March, 1898, after heavy bidding, the Government awarded to Chilean manufacturers a contract for railroad material aggregating about $1,500,000 ($690,000 U. S. cy.). This contract calls for the construction of the following items, viz.:

To the firm of Lever, Murphy & Co., Valparaiso:

Five locomotives for freight (narrow gage), at $28,800 each ($13,248 U. S.), to be delivered, the first two in 52 and the other three in 87 weeks.

Five locomotives for passenger trains (narrow gage), at $30,800 each ($14,168 U. S.), to be delivered at the same time as the above.

Ten tenders at $7,000 each ($3,220 U. S.), to be delivered with the above.

Five sets of reserve pieces for the five freight engines, at $11,700 ($5,382 U. S.).

Five sets of reserve pieces for the five passenger engines, at $12,320 ($5,667 U. S.), to be delivered in 52 weeks.

Sixty plain cars (8 wheels), at $2,200 each ($1,012 U. S.), in two deliveries, the first in 39 and the second in 52 weeks.

To the firm of Balfour, Lyons & Co., Valparaiso:

Six second-class passenger cars, at $9,500 each ($4,370 U. S.).

Twelve third-class passenger cars, at $6,500 each ($,990 U. S.).

Ten box cars, at $1,870 each ($860 U. S.), the first delivery to be made in 38 weeks, the second delivery to be made in 62 weeks, the third delivery to be made in 90 weeks.

To the firm of Hardie & Co., Valparaiso:

Nine first-class passenger cars at $11,700 each ($5,382 U. S.).

Six first and second class combination passenger cars, at $10,800 each ($4,968 U. S.).

Seven (4 wheels) baggage cars, at $5,400 each ($2,484 U. S.); 10 cattle cars (8 wheels), at $3,200 each ($1,472 U. S.); 10 cattle cars (4 wheels), at $2,300 each ($1,058 U. S.); six gravel cars, at $3,850 each ($1,771 U. S.), the first delivery to be made in 40 weeks, the second delivery to be made in 66 weeks, the third delivery to be made in 92 weeks.

To the firm of Thomas Stillmann, Valparaiso:

Sixty cattle cars (8 wheels), at $3,100 each ($1,426 U. S.); 80 tank cars (4 wheels), at $2,150 each ($898 U. S.); 80 box cars, at $1,650 each ($759 U. S.), the first delivery to be made in 30 weeks (90 cars), the second delivery to be made in 50 weeks (90 cars), the third delivery to be made in 60 weeks (40 cars).

Foreign Railroad Notes.

The Bavarian state railroads have been making experiments with the Janney automatic coupler, leaving the old hook couplings on each side, so that either may be used. It is hoped that it may be practicable to follow this course until the whole stock is provided with central draft couplers.

The Prussian state railroads have provided special baggage cars for bicycles. These cars are attached to certain evening trains running into Berlin from nine suburban towns, to which Berlin wheelmen habitually make excursions, and at these stations something like the American check system has been introduced, chiefly for shipping bicycles.

The railroad up the Gornergrat, starting at Zermatt, in Switzerland, opened this summer, reaches an elevation of 9,871 ft., which is the highest point so far reached by any European railroad. Its foot, however, is just about a mile above sea level, and the height overcome by the line is less than on Pilatus and the Rothorn. The latter rises 3,391 ft. before it reaches the elevation of the foot of the Gornergrat road.

A wire-rope carrier was set up last spring from the Casset glacier, 6,600 ft. above the sea at the foot of Mount Pelvou, near Briangon, descending 1,400 ft. in a distance of about 1¼ miles, to a highway road in the valley. This is used solely for carrying ice, which is quarried from the glacier exactly like stone. A very mild winter had made ice scarce.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns pesent only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

It appears that the Commissioner of Internal Revenue has had brought to his attention the question of the application of the internal revenue law to rebate checks given by conductors who collect fares on the trains in excess of the regular fare, and he has decided that these orders come within the law and must bear a two-cent stamp. The Boston & Albany, the Pennsylvania and the Philadelphia & Reading have consequently discontinued the collection of the excess fare. It will be remembered that the St. Paul & Duluth abandoned the rebate order about two months ago. This application of the war revenue law is much to be regretted, for the leveling of train fares down to ticket-fare rates will surely be followed by a large increase in the number of passengers who will get on at way stations without tickets. The only roads that we know of which can make this change without serious loss are the Chicago & Alton and the other Western roads which have adopted the Alton's plan of making passengers show their tickets when they enter the cars. This requirement, with a two-day limit on the life of tickets, is the only method for collecting fares on American roads that has yet been fairly successful. Without thus regulating the conduct of careless and dishonest passengers the railroad is sure to suffer constant loss; and if the conductors are inclined to steal, the loss will be large as well as constant.

A discussion of locomotive staybolts at the May meeting of the Northwest Railway Club brought out no new information, although it showed in a way that a good deal of attention is being given to the matter of staybolts, and practice is by no means uniform. The status of the staybolt at this time seems to be about as follows: It is generally conceded that it is best to use a bolt which is hollow for its whole length, or is hollow for a short distance from the outer sheet. Where solid bolts are used, the diameter at the middle is made less than that of the parts in the sheets. The best practice now seems to be that, when of solid material, all the staybolts be provided with outer end holes, and not alone those of the upper rows, which are most subject to failure. Small compressed air motors have come to be very generally used for tapping the holes and screwing in staybolts, and probably in the majority of shops the small outer holes are drilled by means of pneumatic tools after the bolts are in place. As we have noted in previous issues, these holes are now in some shops drilled and in others punched before the bolts are put in the firebox. The advantage claimed for the punching is that the work can be done more rapidly and cheaply, and that the punching renders the metal of the bolt head more dense. We can imagine, however, that the advantage derived from the greater density of the metal might be offset by the bad effects of heating the bolt if the work were done by careless workmen. Some shops now prefer to put the staybolts in from the inside of the firebox, claiming a better fit can be made, but the more common practice is to start the bolts from the outside. The best methods for cutting the threads on the bolts and the best methods for tapping the holes are still disputed points. The best metal for staybolts is also still in debate, and, while iron is now most commonly used, steel and nickel steel have given such results in laboratory vibration-tests that both these materials are being tried in service in an experimental way. Another indication that staybolts are coming in for a good share of attention is in the action of the Master Mechanics' Association in appointing a committee to report on this subject at the next convention. Evidently this committee has an unusual opportunity to make an interesting and valuable report.

The Nicaragua Canal.

We discover in one of our western exchanges the following extraordinary paragraph:

> The worry of the trans-continental railway people over the probability of the construction of a canal through Nicaragua, uniting the Caribbean Sea and Pacific Ocean, is reflected in the railway press. The Railroad Gazette particularly in making a special plea against it, shows its illogical position and its prejudice only too plainly. Western shippers have learned from bitter experience that there is no deliverance from the rapacity of the railroads except through competition. The Nicaragua Canal is their only hope, for railroad competition is merely a farce. Nothing but a war could have aroused the country to a realization of the importance of a short route by water from our Atlantic to our Pacific coast. It is to be expected that great opposition will be worked up by certain railway men, but the canal must and will be built, even at the risk of hurting the feelings of these people.

This seems a good time to say publicly some things which we have not said before, and to repeat some things which we have said before, but first, we wish simply to call attention to the fact that the editorial article which has excited our contemporary and which was printed in our issue of Aug. 12, says nothing whatever about the building of the Nicaragua Canal as an enterprise; it simply cautions the reader against swallowing whole certain active and prevalent lies.

And now let us consider the influence of the trans-continental railroads in this matter of the Nicaragua Canal. The Railroad Gazette has never been approached, directly or indirectly, by an officer or agent of any trans-continental railroad to use its influence for or against the Nicaragua Canal. No officer or agent of any trans-continental railroad has ever indicated to any officer, editor or agent of the Railroad Gazette that he liked or disliked the attitude of the Railroad Gazette towards the Nicaragua Canal, or that he would like to have the Railroad Gazette take or refrain from taking any attitude whatever towards that canal. If this statement is not clear enough, or specific enough, or comprehensive enough, it is because of our inadequate command of the English language, and we beg that our contemporary will dictate a form of denial which it would like to have us make.

It may be said that the trans-continental railroads have abstained from an effort to corrupt the Railroad Gazette for either one of two reasons: First, because it is not worth corrupting; or, second, because it is considered to be incorruptible. It is possible, however, that the trans-continental railroads have abstained because they have not felt any great reason for opposing the canal. We have heard many stories of the work being done at Washington by railroad agents, but we have not felt enough interest in the matter to follow them up and try to ascertain the truth of them; in fact, the idea of railroad opposition to the Nicaragua Canal is much exaggerated, as may be demonstrated by pure reason without examining any specific case. Any man who is capable of only very elementary reasoning can see that for himself.

The gross earnings of the railroads of the United States for the year ending June 30, 1897, amounted to $1,122,089,773; for the year ending June 30, 1896, $1,150,169,376. The gross earnings of the five trans-continental railroads within the territory of the United States in the last named year (to June 30, 1896), amounted to $110,681,219, or less than 10 per cent. of the total. Now, if the Nicaragua Canal will do for the prosperity of the nation only a small part of what its friends and promoters claim for it, the railroads of the United States have an interest in promoting it, for they will, of course, share in this prosperity just as much as anyone else shares in it, and the opposition of the trans-continental railroads, which earned only 9.6 per cent. of the total gross earnings of the railroads of the United States, would be insignificant. It would be ridiculous for any journal which gets its living directly or indirectly out of the railroads at large to oppose the interest of the great mass of them for the sake of the possible interest of the roads who earn a tenth of the total.

But further, the net earnings of the trans-continental railroads on the traffic that the Nicaragua Canal could possibly affect is a trifling part of their whole net earnings; indeed, it has often been said that those roads would be better off without the competitive freights which they have to carry very cheaply, often, no doubt, at cost. There must be a great deal of such freight on which the railroads could make more money if it were carried to and from the ports by ships, and if the work of the railroads was confined to collecting and distributing this freight inland.

Finally, if the Nicaragua Canal does for the Pacific Coast what its friends and promoters claim that it will do, the railroads of that coast (which are in fact the trans-continental railroads) would profit by the local prosperity.

So we come around to this conclusion: Only here and there an officer of any railroad in the United States has any interest as a railroad officer in opposing the Nicaragua Canal. If he opposes it or if he asks that the project be thoroughly and wisely studied before the United States as a nation embarks in it, he does so as a patriot and a citizen and not as a railroad officer. It follows naturally that among railroad officers, as among other intelligent citizens, there are many differences of opinion on this very complicated and serious matter.

Railroad officers, being used to carrying heavy responsibilities, and having been trained by hard experience to realize that their conduct and opinions carry weight, are more likely to be careful in thought and statement than men who have less responsibility and less to lose. It is not surprising, therefore, if among such men we find many who urge adequate study of the physical conditions, of the political conditions, and of the commercial conditions, before the nation assumes the vast financial and political obligations of this undertaking.

End of the Canadian Pacific Passenger-Rate War.

The Canadian Pacific announces that on Sept. 25 it will restore transcontinental passenger rates to the basis prevailing before the beginning of the war which was precipitated by the Klondyke movement over a year ago. Evidently the very lucid explanation of the facts underlying the controversy between the Canadian Pacific and its American competitors, which Commissioner Prouty gave in his report on the subject last week (Railroad Gazette, Sept. 9, p. 658), convinced our Canadian friends that if their contention was to be based on grounds of reason, which would appeal to non-railroaders, it might as well be abandoned. So far as American traffic managers are concerned the C. P. might have kept up the contest forever; for, according to the barbarous philosophy prevailing among passenger men, a road which demands a differential need present no argument to justify itself other than the facts that its cars are running and that it is willing to carry people at the rates which it gets. But Mr. Prouty's showing that the Canadian Pacific had no disadvantage but time, and probably could easily remedy that, really exposed the whole controversy as one of the old fashioned blood-letting kind, where the only principle is to carry for cost or less until the other fellow gives in—or until you become faint yourself. The showing that Vancouver is, for some traffic, as important as San Francisco, and that, therefore, the Canadian Pacific is not, as in former years, at a great disadvantage in the matter of distance, was the most important fact underlying Commissioner Prouty's argument.

The present announcement is in the shape of a circular signed by Vice-President Shaughnessy, addressed to competing lines, in which the decision of the Interstate Commerce Commission is briefly reviewed. Mr. Shaughnessy quotes the paragraph in which Commissioner Prouty refuted the assertion of the American railroads that the Canadian Pacific had employed the methods of highwaymen and had taken an unfair position generally; and he then goes on to say that his company did not present the whole of its arguments at the Chicago hearing, because it was not understood that the Commission would go into the merits of the differential question. A protest is entered against Mr. Prouty's decision that the Canadian Pacific is not entitled to a share of the passenger business between Boston and San Francisco. It is pointed out that from Eastern Canada to Winnipeg the route by the American lines is as roundabout as the Canadian Pacific line from Boston to San Francisco; yet the Commission allowed the American lines to ignore the fourth section of the law in order to get a part of this Winnipeg traffic. However, the spirit of fairness is so marked in Mr. Prouty's discussion, that the Canadian Pacific will, "as in all previous cases involving United States traffic," be governed by the decision of the Commission, "taking care, of course, to make its rates

the same as those which prevail by any other route;" which means, of course, that the General Passenger Agent will continue to keep a sharp eye out for secret cuts by the American lines. Mr. Shaughnessy says that "the very able analysis" of the question made by Mr. Prouty ignores the fact that several important American lines compete with his road for Canadian traffic; and he asserts that "the Canadian Pacific would be glad to forego all claims to interstate traffic of every description if its United States competitors made no inroads on the business tributary to its lines in Canada." The precise meaning of these last half dozen words is not exactly apparent, but the clause is, no doubt, sufficiently elastic to include cotton cloth from New England bound for Asia by the way of Vancouver, a kind of traffic which the American roads might not be willing to exclude from the term "interstate traffic."

While it will be a decided relief to have this hitherto perennial quarrel out of the way, it is in order to remind our Wall Street friends who have been looking for great changes in earnings whenever peace should be declared, that the earnings on the traffic which has been affected by the low rates are but a trifling fraction of the total income of any or all of the roads. The space-writers have, indeed, had a very prolific controversy over an unimportant matter.

Railroad Pooling and Consolidation in England.

One of the most interesting railroad questions recently discussed in England is that concerning the important negotiations that have lately taken place between the South Eastern and the London, Chatham & Dover railroads. These two companies between them control the main routes from London to the Continent via Dover and Folkestone, and besides do an enormous suburban traffic, as well as monopolize the great and wealthy County of Kent. They have not in the past held a high place in public esteem. Their fares have been, according to the common complaint, the highest in England, their cars the worst, their trains the slowest and most irregular. And though considerable improvements in all these respects have been made in the last few years, the roads have still not reached the standard set by the great northern companies. The traffic between London and the Continent, one of their most important sources of revenue, is pooled by authority of Parliament under an agreement which allows the carrying company to retain a fixed share of the gross receipts (37½ per cent., we believe), to cover working expenses. Needless to say this 37½ per cent. of the receipts was worth fighting for, and the pooling agreement consequently by no means put an end to competition for Continental traffic. Parliament has also authorized the two companies to pool all their other competitive traffic, but this authority has hitherto not been much used.

It has been known for some time that negotiations, tending to secure greater harmony between the two companies, were in progress; and recently it has been announced that the Boards of Directors of the two roads have agreed to establish between them a unity so close that from the public point of view it is hardly distinguishable from amalgamation. The proposal, which has been formally approved by the stockholders of both companies, is that for the present each company shall preserve its independent existence, but that the two railroads shall be worked as one system under the control of a joint committee of the two boards of directors, with one General Manager, one set of engine and car shops, and so forth. The gross receipts would be paid into a common purse, out of which all working expenses would be paid, and then the balance divided between the two companies in fixed proportions. That proportion will be, so it is unofficially stated, 40 per cent. to the Chatham and 60 per cent. to the South Eastern. The present ratio of earnings of the two companies is more like 38 per cent. and 62 per cent., but the Chatham is undoubtedly the more progressive concern of the two.

The agreement is apparently to be in perpetuity, but according to the Chairman of the Chatham line it is only preliminary to amalgamation. For under the new scheme he claims that the public will obtain such great and obvious advantages, that in a few years Parliamentary sanction to an amalgamation bill will be obtained without difficulty. Meanwhile it is not proposed to appear before Parliament at all. But just here is what may prove to be the weak point of the scheme. As before stated, Parliamentary sanction to the pooling of competitive traffic already exists. But we cannot see that any power exists, either under special legislation or the general law, to take Chatham money to repair the roof of a non-competitively South Eastern station, or conversely to take any portion of the receipts of that station to pay a dividend to Chatham shareholders. If this be so—and no one can assert positively that the law is clear the other way—there is a risk that any day the application of a single recalcitrant stockholder, whose motive may, perhaps, only be to "bear" the stocks of the companies, for an injunction and a decision in his favor by the Court of Chancery, may upset in a moment the whole elaborate fabric, as the Reading's absorption of the Central of New Jersey was upset by Chancellor McGill in 1892.

Annual Reports.

Atchison.—Advance sheets of the annual report of the Atchison, Topeka & Santa Fe for the year ending June 30 are now at hand. The year was not less prosperous for the company than for the other western roads, which had the full benefit of the large grain movement as well as the better general business conditions to improve their revenues. Indeed, its gross increase of $5,580,459 is the largest that has so far been recorded and is equal to a gain of 16½ per cent. Expenses increased 12.9 per cent., leaving a net revenue of $2,311,300, or 27.5 per cent. higher than in 1897. On July 1, 1897, the company took over the Santa Fe Pacific, the western division of the old Atlantic & Pacific, and during the year has made other adjustments in mileage so that comparison cannot be made in all items of the income account. But in the following table the revenue is recorded for practically the same lines in the two years, 6,946 miles of operated road:

	1898.	1897.	Inc.
Freight earnings	$28,588,717	$24,254,546	$4,334,171
Passenger earnings	7,347,362	6,166,764	1,180,598
Total gross	39,214,099	33,633,640	5,580,459
Operating expenses—			
Maintenance of way	8,281,398	7,007,345	1,274,053
Maintenance of equipment	4,659,218	3,826,816	832,762
Transportation	14,468,015	13,212,758	1,255,257
General	1,097,645	1,190,292	*92,647
Total operating expenses	$28,506,335	$25,237,211	$3,269,124
Net earnings	10,707,764	8,396,429	2,311,335
Per cent. exp. to earn	72.7	75.0	*2.35

* Decrease.

After deducting taxes and all other charges the company had a balance of $8,882,600 to meet less than $5,000,000 of fixed charges, leaving a surplus of $3,890,000. Out of this the directors had declared the full 4 per cent. on the adjustment bonds, which are an income issue until July, 1900, but have already received 3 per cent. in interest. The present payment will call for $2,069,120, leaving a free balance of $1,821,305, which is equal to 1.38 per cent. on the large amount of the preferred stock outstanding. The summarized income account for 1898 makes the following showing:

Net traffic revenue	$10,707,764
Other receipts	182,027
Total	$10,889,791
Taxes, rentals, etc.	2,007,218
Balance for fixed charges	$8,882,573
Fixed interest account	4,992,148
Surplus	$3,890,425

The fixed charges for the present fiscal year will be on the basis of $5,040,485 a year ($420,040 per month) after Nov. 1, when the retirement of 6 per cent. guaranteed fund notes shall have been completed. The outstanding general mortgage bonds will then amount to about $122,093,000, and the issue will be a first mortgage on all the company's property, subject only to small divisional issues and car trusts.

The improvement of the property has been continued on the same extensive scale which marked the receivership period and the first year and a half of the operation of the property by the present company. The prospect is held out, however, that the present year ought to see the conclusion of the heaviest charges for imrovements, and that the company can then afford to largely decrease maintenance expenses below the present high figures. Of the increased working charges $2,106,000, or about two-thirds of the total, is due to higher maintenance expenses; these were 45 per cent. of the total expenses in 1898. The permanent work during the fiscal year has included the following items.

531 miles of new rails laid, including rails re-rolled.

236 miles of second hand rails laid.

489 miles of track ballasted new and renewed.

11¼ miles of wooden bridges and trestles filled in or replaced with permanent structures.

Shop facilities have been enlarged at various points, the grades on the Texas line reduced, 24 miles of second track built in Kansas, where the traffic is about the heaviest on the system; cuts and embankments widened, etc. There have been erected at various points along the line new station hotels and dining rooms.

The expenditure for construction and improvements on existing mileage charged to capital account was $2,530,372, of which $801,714 was spent on the Atchison main line, $940,253 on the Santa Fe Pacific, $652,450 on the Gulf, Colorado & Santa Fe.

In the traffic statistics we find an all around improvement. What is perhaps specially noticeable is that the higher income of the year is not due chiefly to improvements in freight traffic alone, as with most of the Western companies which have been reporting heavy gains in income in the June 30 year. The Atchison's passenger business has not only kept pace with the growth in freight, but it has even done a little better proportionately. Thus while freight revenues gained 17.8 per cent. over 1897, passenger receipts were 19.1 per cent. better; with ton miles 20.4 per cent. larger than in 1897, passenger miles are 20.8 per cent. better. The relative increase in length of passenger journey was greater than in the freight haul and the percentage of decrease in rates was not so large. These and other traffic statistics are given below, the 1897 figures not being those found in the annual report for that year, but revised totals to cover the mileage as now constituted:

	1898.	1897.	Inc.
No. tons carried	9,979,510	8,578,803	1,400,707
Tons one mile	*2,779,555	2,307,375	472,180
Aver. freight haul	278.5	268.9	9.6
Ton-mile rate (cents)	1.029	1.051	†.022
Passengers carried	4,001,078	3,516,991	484,087
Passengers one mile	*325,650	269,516	56,134
Aver. pass. journey	81.4	76.6	4.8
Pass. mile rate (cents)	2.256	2.288	.032

* 000 omitted.
† Decrease.

A striking feature of the traffic operations is that the freight traffic east and westbound almost balances. Of the total tonnage 53 per cent. was eastbound, but with a longer average journey of westbound freight (298 miles against 261 miles), this slight advantage was almost made up, so that there is a difference of only 134,000 between east and westbound ton miles in a total of nearly 2,780 millions. On the Atchison main line the excess is with eastbound tonnage, but on the other divisions the reverse holds. In passenger traffic about 47 per cent. of the mileage made is eastbound travel. Of the company's total tonnage 16.3 per cent. is grain, and 30.2 per cent. agricultural products. Bituminous coal tonnage is much the largest single class of freight, and more than 200,000 tons above the total of grain; live stock tonnage ranks second and lumber third, being 8.6 per cent. of the whole, and practically the same as wheat tonnage. Merchandise gave 6.75 per cent. of the total, and the various manufactured products foot up 10.7 per cent.

The report refers to a number of new roads completed last year or under construction, as feeders or connections of the system, but financial liabilities have been incurred in connection with only one; a loan of $750,000, payable in 1899, has been subscribed to aid the Pecos Valley & Northeastern, whose line will connect the Panhandle branch with the Pecos Valley in New Mexico, passing through an important cattle breeding region of Northeastern Texas. The charges to capital account in 1898 were $2,861,782, of which $2,563,759 were for improvements, $162,266 for extensions and $135,757 for equipment. The company has no floating debt, its current assets are largely in excess of current liabilities, and the financial condition of the property is thoroughly sound and satisfactory.

New York, Ontario & Western.—The revenue accounts of this company for the year ending June 30 show little change from those of the previous year, either in gross or net, or in the final surplus. Gross earnings were but $20,232, or ½ per cent. above last year's total, and with an increase of $32,918 in working charges, net earnings, less taxes, were $914 below those of 1897.

There were three factors tending to decrease receipts. The anthracite trade, which gives the company over half its freight revenue, was unsatisfactory throughout the year. The tonnage decreased for the fourth successive year, and the revenue obtained, $1,666,000, was lower than in 1897 or 1894, though exceeding that in the intervening years. The milk traffic for the first time since that business became important failed to show its usual gain in receipts, but fell about $10,000 below last year's total. This halt in development is attributable to the revision of rates, following the orders of the Interstate Commerce Commission, in May, 1897, by which the old uniform rates for carrying milk cans, whatever the distance, were abrogated, and a group rate system, with the old uniform rate as the maximum charge, was instituted. The total of milk carried was about the same in the two years the longer distance shipments fell off, while the shorter hauls increased. This resulted in a decrease of ¼ per cent. in miles run, of .8 per cent. in train miles and of 2 per cent. in revenue earned. President Fowler points out that the change in the system of rates has made no appreciable difference in the price received by farmers for their milk, the saving in freights being absorbed by dealers.

The third factor adversely affecting revenue was the two-cent a mile rate on passenger business, which reduced the average rate per passenger mile from 2.064 cents to 1.839 cents, although the rate was in effect only the last two months of the year. It is expected that the reduced rates will stimulate enough new travel to more than make up the loss so far reported. The general results of operations for the last three years will be found below:

	1898.	1897.	1896.
Earnings.			
Coal earn	$1,666,242	$1,722,936	$1,588,424
Milk earn	433,883	443,408	425,614
Total freight	3,150,183	3,134,085	3,002,363
Pass. earn	641,679	638,659	654,067
Total gross	$3,914,635	$3,894,403	$3,779,336
Expenses.			
Main. way	$563,489	$546,017	$479,193
Main. equip.	469,754	451,718	466,916
Cond. transp.	1,544,816	1,531,201	1,518,339
Genl. expen.	120,718	120,924	121,460
Taxes	112,865	124,637	112,600
Total exp.	$2,801,643	$2,780,496	$2,698,558
Net earn.	1,112,993	1,113,907	1,080,777
Int., etc.	710,533	713 996	705,208
Surplus	402,460	399,911	375,569

The chief interest in Ontario & Western operations may be said to lie in its detailed statistics of operations. Large increases in revenue cannot be expected, and the officers have to be content with

gradual development of traffic, fostering it by every means possible. This they have done with marked success, especially the development of summer resort travel and the milk business, and there has also been a steady growth in general business. But the economy with which the road is operated is evidence of the intelligence with which its peculiar problems have been met. The statistics of the last two years show the progress of these economies, as have the previous reports. The ton-miles increased last year over 1897 by 1,027,000, or 3 per cent., but the freight train miles decreased 151,000, or 11.9 per cent. The freight train mile earnings were $1.91 against $1.74 in 1897, the net train mile earnings being 64 cents against 58 cents last year. The train load on the main line is now 256 tons against 232 tons, a gain of 10.3 per cent., while the train load on the leased lines and branches is 269 tons, or 32 tons above last year's figures.

The General Manager's report contains several tables, showing the progress made since 1888 in increasing the train and car loads and in economizing car and train mileage. The increases in the train and car loads and the average number of cars hauled per train, between 1888 and 1898, with the figures for various years, are shown below, the figures referring only to main line traffic.

	Tons per train.	Tons per car.	Cars per train.
1888	123	7.20	17.1
1891	170	8.66	19.6
1893	176	9.00	19.6
1896	219	10.30	21.3
1897	232	10.29	22.5
1898	256	10.92	23.5

The line crosses a series of mountain ranges, and grades are not concentrated. Pushers are used on the heaviest grades. Forty-two per cent. of the main line, via Pecksport, is on grades of over 50 ft. per mile; 17 per cent. over 65 ft. per mile, and 10 per cent. is from 70 to 80 ft. per mile. In making the above table, miles run by a pusher or assisting engine in service are counted as train miles. The heaviest engines in service weigh only 62½ tons.

The Scranton division was opened in 1890, and that fact accounts in part for the sharp increase in the train load in 1891, that figure having been 132 tons.

About 90 per cent. of the freight carried is one-way tonnage, cars returning empty. Cars loaded with merchandise average light in tonnage. The average number of tons carried in coal cars is now 23 gross tons. There is but little merchandise carried on the Scranton Division, the tonnage being chiefly coal, and on that division the average tons carried per freight train in the last year were 292 tons.

The economy effected in saving train and car miles is shown by the following figures for the same years, main line operations only being included:

	Train miles.	Car miles.	Ton miles.
1888	799,729	11,363,474	81,820,504
1891	1,326,470	22,502,704	194,897,759
1893	1,848,111	32,747,185	294,636,533
1896	1,834,808	34,609,182	356,414,070
1897	1,764,167	34,309,163	353,100,732
1898	1,617,886	32,432,447	354,127,528

The increase in the ton miles since 1888 has been 332.8 per cent., while train miles have increased but 102.3 per cent., and the car miles 185 per cent. The increase in the train load was 108 per cent. Comparing with 1893, it will be seen that while ton miles have increased 20 per cent., the train miles run have actually decreased 12 per cent. The gain in the train load has been 45 per cent. since 1893.

New York Central.—Advance sheets of the annual report of this company for the June 30 fiscal year have been issued, giving the general results of operations, but omitting the detailed figures of expenses and traffic. Gross earnings are higher than in any other year except in 1893, the World's Fair year, when the total was $512,127 above the $45,774,240 reported in 1898. The net earnings, $16,263,226, however, are above every other year, the excess over 1893 being $608,592. The fact that gross earnings are not up to the best previous total is due to the passenger business. Yet the 1898 passenger receipts would have shown a worse comparison but for the large gains in commutation travel. In ten years suburban traffic has doubled on the Harlem and Hudson divisions.

The freight revenues last year were $27,496,100, being $1,645,398 above the 1897 total and $124,000 above the previous high figure of 1893. The summarized results for the last two years follow:

Earnings:	1898.	1897.	Inc.
Freight earn	$27,496,130	$25,850,731	$1,645,399
Passenger earn	13,250,801	13,094,620	156,181
Total gross	45,773,521	43,614,405	2,159,116
Expenses:			
Main. of way	$4,660,633	$4,838,267	*$177,634
Main. of equip	4,987,192	4,435,473	551,719
Traffic	18,735,462	17,215,889	1,519,573
General	1,127,728	1,110,283	17,444
Total	$29,511,015	$27,599,912	$1,911,103
Net earn	16,262,506	16,014,493	248,013
Div. on Lake Shore and Mich. Central stock	1,559,974	....	1,559,974
Other income	692,218	665,735	26,483
Total income	$18,514,698	$16,680,228	$1,834,470
Fixed charges	13,560,227	12,328,361	1,231,866
Net income	$4,954,471	$4,351,867	$602,604

*Decrease.

Out of the net income reported above was deducted $300,000 as a sinking fund for the debentures of 1890 and $4,000,000 for dividends, being 4 per cent. for the year, leaving a surplus for the year of $654,471 to be carried to profit and loss. This account was charged with $2,344,998 of expenses of refunding the bonded debt and other smaller charges, bringing the total up to $2,695,298 and reducing the profit and loss credit to $9,424,173 on June 30, 1898, as against $11,465,000 a year before.

The traffic figures show totals which in few instances have ever been exceeded. Both the way and through freight and the total revenue ton-miles are higher than the best previous records. The total number of passengers carried is also greater than ever before, but the passenger miles run were exceeded in 1896, as well as in 1894 and 1893. Both freight and passenger train mileage are also higher than any previous figures.

The ton-mile rate has fallen more decidedly than in any other recent year, being now 6.1 mills, against 6.8 mills in 1897. The ton-mile cost also increased, so that the net ton-mile rate of 1.8 mills compares with 2.2 mills a year ago. The gross train mile earnings were $1.84, against $1.83 last year, and with larger expenses per train mile the net receipts were reduced to 54 cents from 59 cents. The passenger-mile rate fell from 1.90 cents to 1.86 cents.

In the carriage of freight important progress in economy was made. The average revenue train load was 299 tons, against 270 tons in 1897, 268 in 1896, 252 in 1895, 249 in 1894 and 270 in 1893. Including company freight, the train load was 320 tons, against 290 tons in 1897. The average freight haul was 192 miles, against 184 miles last year, 175 in 1896 and 169 in 1895. It is higher than reached since 1885, but was exceeded in every year previous to that back to 1870.

As compared with 1897 alone, the tonnage shows an increase of 13 per cent. and ton-miles 19 per cent., against 6 per cent. in freight receipts. Five per cent. of the gain in tonnage was in low class freights, the ton-mile rate being the lowest ever reported, the loss of .7 mill being as much as the falling off in the previous seven or eight years. Of the increase in tonnage the largest share was in way freight, 1,918,000 tons, against 836,000 tons gained in through tonnage.

The expenses of the year included $1,345,949 for extraordinary outlays, chiefly equipment, this account including $1,157,339 of such charges, being the cost of building 1,090 cars built at West Albany, 20 passenger engines, etc. The policy of renewing 15-ton and 20-ton capacity cars with 30-ton cars has more than doubled the tonnage capacity of freight cars in ten years, although the inventory is practically the same.

The decrease in the cost of maintenance of way was due to the fact that the extraordinary replacements of rail in the preceding eight years enabled the company to maintain its track superstructure without heavy renewals during the year just closed. (During the period referred to 235,000 tons of from 65-lb. to 100-lb. had been purchased for relaying 2,042 miles of track.) The roadway has received special attention, and improvements of permanent value have been made in many of the station and shop buildings.

The financial transactions of the year were, of course, of the largest nature, including, as they did, the leasing of the Lake Shore and the Michigan Central, and the promulgation of a comprehensive plan for refunding the company's bonded debt at 3½ per cent. Up to June 30 $89,938,625 of Lake Shore collateral bonds (secured by deposit of the shares) had been issued by the New York Central for $44,969,313 in stock out of the total of $50,000,000. Of the Michigan Central bonds, $17,137,415 had been issued for $14,902,100 in stock out of a total of $18,738,000. The refunding of the New York Central's bonded debt has progressed so far that $23,499,600 of the new bonds have been issued in exchange for $21,480,986 of the old securities, effecting a saving in interest of $197,710. Besides this, $2,019,000 of the new bonds have been sold for cash, the proceeds to be used for the general purposes of the company, except the odd $19,000.

Erie.—The annual report for the year ending June 30 is the third issued by the reorganized company, but the second to cover a full fiscal year. The gross earnings increased largely, $2,243,829, or 7 per cent. As with so many other companies, advantage was taken of the larger revenue to carry out improvements, so that the increase in expenses nearly balances the gain in gross receipts, leaving net earnings $138,034, or 1.69 per cent. above last year's total. Interest and rentals were considerably larger than in 1897, but the clear surplus on the year's operations was $633,917, which is arrived at after including in expenses a large amount of extraordinary work. The principal details of the accounts of 1898 and 1897 follow:

Earnings.	1898.	1897.	Increase.
Freight earnings	$18,081,023	$16,609,449	$1,471,574
Coal earnings	7,359,881	6,867,135	482,746
Passenger earnings	5,957,704	5,742,807	244,897
Total gross	33,740,860	31,497,031	2,243,829
Expenses.			
Maint. way	3,383,499	3,089,608	283,891
Maint. equipment	5,357,611	4,387,392	920,219
Cond. transp	15,085,321	14,294,818	790,503
General	733,687	676,336	57,361
Taxes	877,921	844,097	*6,176
Total	$25,438,038	$23,332,341	$2,105,787
P. C. expenses to earnings	75.39	74.08	1.31
Net earnings	8,302,822	8,164,788	138,034

*Decrease.

The increased traffic revenue was due most largely to merchandise business. The volume of this traffic was 20.2 per cent. higher than in 1897, the total tons carried being 12,701,700. The ton-miles increased 459 millions or 17.3 per cent., while the revenue increase was equal to 8.8 per cent. The ton-mile rate continues to fall, being now 5.80 mills, against 6.25 mills last year. The rate in eight years has fallen from 6.76 mills, or 14 per cent. The ton-mile rate on coal fell from 5.36 mills to 5.12 mills. The increase of over 7 per cent. in revenue from this business is rather unlooked for, in view of the unsettled condition of both the hard and soft coal trade throughout the year. Yet the company not only held its tonnage, but shows gains of 11.7 per cent. in anthracite and of 11 per cent. in bituminous, while coke gained 387,500 tons, or 47 per cent.

The principal freight traffic statistics covering all freight carried follow:

	1898.	1897.	Increase.
Tons moved	26,643,425	20,122,086	3,521,339
Ton miles*	4,556,349	3,939,679	616,670
Average haul miles	193	196	†3
Ton mile rate	c. 558	c. 596	†.038
Ton mile cost	.400	.428	.028
Frt. T. mile earn	$1,675	$1,646	.029
Average train load (tons)	300	276	24
Average freight car load	14.8	13.9	.9
Freight tr. miles	15,186,023	14,364,390	921,747
Car miles	470,678,000	420,798,000	49,880,000
Total engine miles	30,236,000	28,321,200	1,914,800

* 000 omitted. †Decrease.

The largest single increase in tonnage was in iron and other ores, 601,000 tons, or 57 per cent.; other heavy gains were grain, 286,300 tons, or 22 per cent.; merchandise, 206,000, 24 per cent.; pig and bloom iron, 210,800 tons, or 43 per cent., all of which shows the diversity of tonnage and the part the improved conditions in general business played.

The ton-miles run, as shown in the above table, increased 15.6 per cent., but the freight train mileage actually decreased in the large amount of 921,700 miles, or 6.46 per cent., while the car mileage was 49,880 thousands, or 11.8 per cent. less than last year. The average tons per car increased 13.94 to 14.84, the train load reaching 300 tons, about the same as on the New York Central. In 1897 the Erie had an advantage of six tons, but the Central gained 29 tons in the year, against the Erie's 23.8 tons, so that the difference between the train loads on the two roads is only one ton. The length of haul is also practically the same, 192 miles. Erie's ton-mile rate of 5.58 mills compares with 6.1 mills on the New York Central, and its gross freight train mile earnings, $1.675, compare with $1.83 on the Central. Its train mile expenses are reported at $1.199, against $1.29 on the Central.

Much the largest increase in expenses was the equipment account. This was equal to 22 per cent., while the total expenses were only 9 per cent. heavier than in 1897. In maintenance of way the increase was 9½ per cent., and in traffic expenses 5½ per cent., against the gain of 15½ per cent. in ton miles. One special reason for the increase in equipment expenses is that the cost of safety appliances (6,956 couplers, and 5,597 air brakes), amounting to $526,286, was included, and the Erie is adopting a conservative course in charging expenses with the cost of this work, although only following the policy adopted last year. The total of this expense from the beginning has been $2,804,800. The general repairs to engines and cars were particularly heavy. Twenty-one light passenger engines were converted into 2 and 4-cylinder compounds, 27 freight locomotives were rebuilt with larger boilers and cylinders and 500 box cars were built to fill vacant numbers and paid for out of expenses. Besides this work $1,531,455 was charged to capital for 2,200 additional freight cars. The charge to capital for construction work was $575,129, making the total so charged by the new company since its organization, $1,415,752.

During the year the New York, Susquehanna & Western was acquired, and 130,000 shares each of first preferred and common stock issued for this purpose. There has been no material change in the bonded debt, but the general lien bond will hereafter draw 4 per cent. interest instead of 3 per cent.

Wabash.—The year was a prosperous one for the company, although it began with a coal strike which threatened heavy losses. The better grain traffic and general business, however, enabled the company to close the year with an increase in gross of $1,681,075 or 14.5 per cent., but most of this was lost in greater operating expenses, and net traffic revenues were only $355,455 above last year. The surplus above obligatory fixed charges, however, was $401,496, against $28,536 in 1897, $31,800 in 1896 and a deficit of $542,907 in 1895.

The company earned for the first time since 1893 the full 6 per cent. interest on its debenture A bonds and something on the much larger issue of debenture B bonds. No interest will be paid this year on either of these issues, because the surplus has been used to reduce the floating debt of $800,000 existing a year ago. This was incurred to keep up interest payments on the first and second mortgage bonds in 1894 and 1895, and has now been reduced one-half.

The soft coal strike lasted about four months, and intimately concerned the company, because ordinarily about a fourth of its business is bituminous coal. In 1897 the percentage was 25.7 per cent., but in 1898 this had fallen to 17.7 per cent. The actual loss in tonnage was 405,000 tons; in revenue $250,000, while $163,000 of the added cost of locomotive fuel was attributable to the strike.

During the year the company opened its Buffalo Division, using the Grand Trunk tracks from Detroit

to Buffalo in connection with those of the Erie between Suspension Bridge and Buffalo, and it also took over the Hannibal cut-off in Missouri, etc., adding altogether 342 miles to its operated line. Accounts connected with these various leases and arrangements explain a good proportion of the increase of $1,325,620 in expenses. The summarized operations for the last two years follow:

	1898.	1897.	Inc.
Mileage..	2,326	1,921	405
Gross earn.....	$13,207,862	$11,526,787	$1,681,075
Oper. exp.....	9,304,779	7,979,159	1,325,620
Net earn.....	$3,903,083	$3,547,628	$355,455
Taxes...	499,486	529,970	30,484
Joint track rentals.....	488,211	408,085	80,126
Net earn.....	3,096,041	2,722,877	373,164
Interest....	2,694,545	2,694,545	....
Surplus..	$401,496	$28,332	$373,164

Of the total increase in operating expenses $595,000 was due to higher cost of conducting transportation, $415,800 to motive power charges, $186,000 to the car department and $120,900 to maintenance of way. General Manager Ramsey attributes $275,900 of the increase in transportation account, $130,351 of that in motive power expenses and $21,723 of the higher maintenance of way charges to the opening of the Buffalo Division, and car expenses were also increased through the same cause.

The General Manager points out, as it is necessary to do in most of the reports now being published, that the figures of maintenance of way expenses do not give a fair idea of the improvement made in physical condition. The lower price of rails has permitted a much larger amount of work to be done with even decreased expenses. On the Wabash about double the amount of rails was laid in 1897 at two-fifths the cost. One lot of 5,000 tons of old rails was sold for within 50 cents per ton of the cost of the new rail. The average difference between the prices obtained for old rails, of all qualities, sold, and the cost of new rails at the mills was less than $4. These conditions were taken advantage of and 21,009 tons of 80-lb. rails were purchased, and for the year ending June 30, 1899, contracts made for 26,250 tons. Of this latter contract some 1,600 tons were laid in track before June 30 last. Also 1,990 tons of old 63-lb. rail were rerolled by the McKenna process at a cost of $11,053. Other maintenance work included the laying of 826,961 cross ties, or 307,283 ties more than last year, at an added cost of $75,804.

The new equipment includes five passenger engines of the Atlantic type, 20 ten-wheel freight engines with a tonnage capacity 40 or 45 per cent. greater than the company's best engines now in service; 1,500 30-ton box cars and 10 passenger cars, payment being made largely in notes maturing monthly, those for the last 1,000 box cars being spread over five or six years.

The gain in tonnage carried was 428,100 tons, not much more than the loss in soft coal, 405,000 tons. The largest gain was in corn, 150,000 tons. The ton-miles increased 18.8 per cent., and the freight train mileage 904,313 miles, of which 329,385 miles was on the Buffalo Division. The ton-mile rate was 6.24 mills, a decrease of 5½ per cent., but the cost was also reduced, so that the net ton-mile rate is 1.77 mills against 1.91 mills in 1897. The train load reached 217 tons against 213 tons last year, 193 in 1896 and 176 tons in 1895. Up to March 1, when the Buffalo Division began to seriously affect the train load, the average train load for the year was 226 tons.

The cotton crop of the United States for the year ending Sept. 1, as reported by the Commercial and Financial Chronicle, amounted to 11,180,960 bales, of which 8,676,407 bales were delivered at the shipping ports; and of this last named quantity, 7,532,615 bales were exported. The figures for three years are as follows:

Year ending September 1.	1897-98.	1896-97.	1895-96.
Receipts at the shipping ports .....bales.	8,676,407	6,816,525	5,394,875
Add shipments from Tennessee, &c., direct to manufacturers	1,276,614	873,004	851,788
Totals	9,953,021	7,689,529	6,246,663
Manufactured South, not included above.....	1,227,939	1,024,482	915,810
Total cotton crop for the year ....bales	11,180,960	8,714,011	7,162,473

Exports to Canada by rail during the year amounted to 113,470 bales, making the total exports 7,646,085 bales, as compared with about six millions the year before, and less than five millions the year before that. The receipts at the various ports seem to have increased quite uniformly, except that the total at the ports of Virginia decreased from 714,716 bales in 1897, to 567,981 bales this year. It will be observed that the quantity of cotton made into cloth in the Southern States, 1,227,939 bales, is about 34 per cent. greater than in 1895-6. The Southern mills are steadily getting a firmer place in the market for the coarser grades of goods.

TRADE CATALOGUES.

The Lake Shore Limited.—This is the title of a pamphlet issued by the New York Central & Hudson River, the Lake Shore & Michigan Southern and the Boston & Albany, describing the well known 24-hour New York-Chicago trains run over these lines. It goes without saying that the cars are as luxurious as it is possible to make them; and, as every one knows, the facilities for comfort on these trains are exceeded only by those on the Siberian Railroad, where the passengers have access to a gymnasium and some other conveniences which this newly civilized country has not yet attained to. The notable feature of the Lake Shore Limited pamphlet is a time table for the trains in each direction, in which concise notes are given of all the sights along the road in which the passenger will be interested. This is the best arranged memorandum of this kind that we have ever seen. For example, from the time table of the Eastward trip we extract the following:

"5.41 a. m.—Arrive Dunkirk, 500 miles from Chicago, 40 from Buffalo; 10,000 population. Plant of the Brooks Locomotive Works on right just after leaving the station. 5.54 a. m. pass Silver Creek station and cross Silver Creek; fine view on right. 5.56 a. m. pass Silver Creek Bay on left. 6.09 a. m. pass Angola. 6.10 a. m. cross Big Sister Creek. 6.19 a. m. cross Eighteen Mile Creek. 6.21 a. m. pass Wanakah; view of Lake Erie on left. 6.27 a. m. Athol Springs is passed. 6.32 a. m. pass under tracks of the Terminal Railway of Buffalo, which line is for the transfer of freight trains around Buffalo from the Lake Shore yards at West Seneca to Depew on the New York Central. 6.32 a. m. pass through West Seneca yards, more than two miles long and containing 25 miles of tracks. 6.37 a. m., enter city limits of Buffalo; cross Buffalo Creek Railroad and Buffalo Creek, which rises in eastern Erie County and flows north and west into Lake Erie at Buffalo. 6.38 a. m. pass under Delaware, Lackawanna & Western Railroad. 6.39 a. m. pass under Lehigh Valley Railroad. 6.40 a. m., cross Erie Railroad. 6.50 a. m. arrive Buffalo," and so on.

Electric Street Railroad History.—The Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., has issued Part I. of a series on electric street railroad history, giving a brief review of the Westinghouse motors, with special reference to generating apparatus. The following motors are included in the descriptions: Numbers 3, 12 A, 38, 38 B, 49, 50, all Westinghouse machines. The last half of this trade publication is taken up with descriptions of the well-known types of Westinghouse generators, closing with views of the interior of the shops at Pittsburgh, and a few engravings of some very large installations.

Christensen Engineering Co., Milwaukee, Wis., has issued a souvenir edition of its catalogue, setting forth the advantages of the Christensen system of applying air brakes, the pumps being worked by electric motors. Letters are reproduced from many who have used this method, and carefully executed engravings aid in giving an idea of the machinery and the method in which this system is applied to cars.

Profitable Feeder Lines for Trunk Railroads.—Under this title the J. G. Brill Co., of Philadelphia, issues the 6 in x 9 in. pamphlet illustrating and describing the Brill No. 27 trucks as applied to the cars of the Buffalo & Lockport Street Railroad, which recently changed its motive power from steam to electricity. The trucks described are designed especially for high speed and heavy service.

An English Cable Railroad of 1840.

As many readers of the Railroad Gazette must know, the system originally adopted on the London & Blackwall Railway was cable traction. This line, with the exception of the London & Greenwich Railway (Railroad Gazette of Dec. 18, 1896,) was the first purely local one in the metropolis. Authorized in 1836 as the Commercial Railway, its principal object was to convey steamboat passengers to and from Blackwall. In those days London was the great point of departure for the Continent. As the course of the line lay among busy docks and shipyards, near large warehouses and in a densely peopled neighborhood, it was decided not to use locomotives for fear of constant fires due to the sparks. The engineers, George Stephenson and G. P. Bidder, therefore evolved a mode of pulling the trains with ropes worked by stationary engines at each end of the line.

At the London terminus in the Minories were two 112 H. P. engines of the marine side-lever type, one on each side of the line, below the viaduct. At the Blackwall end, distant 3¼ miles, two of 70 H. P. were placed on the north side of the line, which is there in a shallow excavation. Only 4½ lbs. pressure was carried in the boilers. The main driving wheels of these engines were 17 ft. in diameter, working by means of cogwheels of 10 ft. 10 in. diameter, fixed on the shaft carrying the winding drum. This was grooved, 23 ft. diameter outside and 3 ft. 8 in. broad. Each engine had its own drum, making two at each end; there were two hempen ropes, each 6½ miles long, 5¾ in. diameter and 40 tons in weight. These ropes ran in sheaves or grooved pulleys 30 ft. apart, 7 to 8 in. wide and from 30 to 36 in. in diameter. Owing to the great wear and tear and frequent breakages of the hempen ropes, wires ones consisting of six strands of six wires each were substituted after a few years, with satisfactory results.

The railroad was opened for traffic as a single line on July 6, 1840, but was soon completed as a double road, and the rope-working well organized and established. Five intermediate stations were provided. At appointed intervals a coach would be standing at each of these, ready for a down trip to Blackwall, and seven more coaches stood ready at the Minories terminus coupled together. Each being attached to the rope by a gripper, the Blackwall engines commenced to wind in, after receiving telegraphic notice from each station that all was ready. The coach from Poplar arrived of course almost immediately, the guard releasing the rope, running the last few yards by impetus and stopping with a lever brake. Then came in the West India Dock coach, followed by the Limehouse, Stepney and Shadwell ones and by the first two of the seven which started from London. Of the five missing ones, the last was slipped from the rope at Shadwell and left there ready for an up journey. The last but one was similarly left at Stepney, the next in front of that at Limehouse, the middle one of the seven at West India Dock; the one which had been in front of it stopped at Poplar, and as just stated the two front vehicles went through to Blackwall. The return journey was worked in the same way. The London engines were the most powerful, as the line rose on the average 1 in 248 toward the end. Meanwhile exactly the same process would be going on upon the other line of rails, each being used alternately for up and down traffic quite independently of its neighbor. The speed was about 26 miles an hour.

It will be observed that the system in question provided only for traffic to and from the termini. Passengers could only get from one intermediate station to another by going first to London or Blackwall. In a densely populated district this was a serious failing, and probably accounted largely for the financial failure of the line. It never paid more than 1 per cent. or so, the working expenses generally nearly equaling the receipts, while the first cost was enormous. A large goods traffic was expected, but hardly any came. It was not then clearly understood that it does not pay to put goods on rail for only 2 or 3 miles. There is probably no local goods traffic whatever now, though plenty from other lines. All the passenger traffic is intermediate, or to and from London; very few people ever go to Blackwall.

It was on the Blackwall line that the electric telegraph of Cooke and Wheatstone first made part of the original working system of a railroad. The wires were at first laid in welded iron pipes, with screwed joints like gas pipes, along each side of the line. One of the original instruments belonging to this installation is now at South Kensington Museum.

In 1841 the line was extended 300 or 400 yards further, to near Fenchurch street, at a cost of about a quarter of a million sterling. The trains ran up hill into this station by impetus and went out by gravity, stopping at the Minories to be attached to the rope. The rope working went on till 1849, when an extension to the Eastern Counties (now Great Eastern) Railway necessitated the gage being altered from 5 ft. or 5 ft. ½ in. to 4 ft. 8½ in., locomotives being introduced at the same time. The line is now worked by the Great Eastern with 6-wheel coupled tank engines, a 15-minute service in each direction; but Fenchurch street is better known as the terminus of the London, Tilbury & Southend Railway, which runs over the extension just named. The old terminus at Brunswick Wharf, Blackwall, still exists unaltered, but also deserted. The stairs leading down between the lampposts in front remain, though few if any steamers ever call there now. Close by the ruins of the winding-engine house may be found. W. B. PALEY.

Chelsea, London.

Early Iron Bridge Construction.*

By G. Leverich.

I can do no more than briefly recall, without reference to authenticated records, what I have known or done, early in the art of iron bridge construction.

The first structures of this kind I saw were built after Squire Whipple's designs, and presumably under his direction, over the Erie Canal, at West Troy, N. Y., and on the Troy and Schenectady branch of what is now the New York Central & Hudson River Railroad. This was in 1855. The bridges over the canal were double arched trusses; the upper chords were of cast iron of tubular section, with joints apparently in the rough as cast; to secure a bearing, the spaces between were filled with sheet lead. The lower chords were of wrought iron, square bars, linked over cylindrical pins. The railroad bridge was of two rectangular trusses, in design much like that prevailing now; the upper chords and the posts were of cast iron, and the lower chords of wrought iron, in section and disposal—and the details as well—much like the similar parts in the canal bridges mentioned. Each was pin connected; the first of the type since generally designated as "American"—in distinction from structures the members of which were riveted together, and known as "English." This bridge was fully described and illustrated in the Report of the Railroad Commissioners, State of New York, for 1857 (or not much later). In this report was

*Reminiscences written in 1888, at the request of an Alumnus (class 1861), who then proposed to compile a record of the development of this branch of engineering construction. Reprinted from The Polytechnic. The references to the classes indicate the class in the Rensselaer Polytechnic Institute, to which the individual belonged.

included an examination made of the structure, to determine its safe strength, by James Laurie (First President of Am. Soc. C. E.), which, judged by later standards, was singularly correct—much that he then laid down has since been adopted as essential to proper design. The bridge was in service many years; over it on a single track, passed trains, in number and weight regularly increasing, until the locomotives which hauled them were at least twice as heavy as contemplated when the bridge was built.

In 1860 I was employed by the Trenton Locomotive and Machine Co. at Trenton, N. J., which had under the direction of Mr. Albert Fink (afterward tenth President of the Am. Soc. C. E.), the patentee, and of Captain (now General) William Sooy Smith, Secretary of the company, built road and railroad bridges of the Fink type; the company had also built other styles of iron bridges. . . .

I recall that our manager, when reciting the assured merits of the Fink design, always alleged—and erroneously—that the proportionate lengths of the cast and wrought iron members were such that each was similarly strained under all changes of temperature. Previously to that time, another company in Trenton had engaged in iron bridge building—Plympton & Murphy—composed of George W. Plympton (class of 1847), and John W. Murphy (class of 1847), whose name from then has been attached to the "Murphy-Whipple bridge." . . .

Soon after engagement with this company the Civil War began, and afterward during my service but little bridge construction was done. Among the contracts was one for sinking in place pneumatic pile foundations in the Savannah River on the line of the Charleston & Savannah Railroad. These piles were large cylinders of cast iron, and sunk by the pneumatic process—the second application in this country of a method which has since largely been adopted in suitable locations. This work was begun by Capt. Smith and continued by Mr. Charles C. Martin (class of 1856) until hostilities caused its suspension and drove him North. A full description of its prosecution, written by Mr. Joseph Bennet, then a leading civil engineer, long since deceased—was printed in the "Journal of the Franklin Institute," possibly in 1862—the first publication of the kind in an American technical paper.

Another contract covered a bridge over the Harlem River, on Third avenue, New York—in this was a swing draw, consisting of two box girders, varying in depth from center outward, which was nearly completed at the works when a change in official management caused a sale of the contract to Mr. John Roach, then owner of a small iron foundry, but afterward the first successful American constructor of iron ships—and he, after long delays, completed the structure. The original designs were made under the direction of Hon. William J. McAlpine (third President Am. Soc. C. E.), Chief Engineer; he was succeeded by Mr. Erastus Smith, then a conspicuous marine engineer, who, assisted by Mr. Theopolis Sickles (afterward Chief Engineer of the Union Pacifi R. R.), and Mr. Isaiah Rogers, concluded the undertaking. . . .

Among other and minor contracts was one with Mr. John W. Murphy for the construction of several pin connected railroad bridges of about 50 ft. span; the trusses had inclined end posts, and were divided into square panels—the upper chords and posts were tubular and of cast iron; the other members were flat or square bars, with eyes at the ends. All joints and bearings were either bored or turned to a close fit; and the shop was proud, when upon assembling one of the bridges in the yard, it was found that a sheet of paper could not be inserted between any two adjacent bearing surfaces.

The design differed from and was in advance of preceding ones (although common enough since) in that no provision was made for adjustment during or after erection, each member being finished to a precise and determined length. Mr. Murphy once said in referring to this inovation "that he had done with bridges with an Irishman in them." One of his earlier railroad bridges, while being adjusted by a track man at the approach of winter—as then was thought necessary because of reduction of temperature, to relieve stress on the minor members—was temporarily left by him with about half of these members slacked off; in the interval a coal train passed over and wrecked the structure.

Mr. George B. Roberts (class of 1849), as inspecting engineer, came to the works when these bridges were nearly completed; most I now recall of his examination was that during the whole time he wore bright yellow kid gloves and did not soil them. He it was, it will be remembered, who became President of the Pennsylvania R. R. Co., and displayed rare ability and judgment in his administration of its multitudinous affairs.

During the first year I was at Trenton business was almost stagnant, and opportunity was had for study of the design of iron bridges, and determination of the stresses upon the several members. What had been taught Mr. Martin (Civil Engineer of the company—as I was the Secretary, succeeding Capt. Smith) or to myself or what aid in the investigation we could get from others near to us, was of little worth. We had the first edition of Whipple's complete treatise—printed in 1847—also Latham's "Wrought Iron Bridges" and Bow's "Bracing"—each an English work and issued about 1858. . . . To illustrate the lack of ready but precise and analytic methods in the determination of the stresses, it may be mentioned that Plympton & Murphy had constructed a model of a bridge, from which any member could be withdrawn and instead a spring balance inserted, to indicate the stress on that particular member.

In our investigations, we early determined that the style of general design, whether the "Fink," "Whipple," or plain rectangular, as has so long been in vogue, had little to do with variation in economy in construction—and we began to elaborate details with a view to simplify them and reduce their cost. About that time an iron railroad bridge in Massachusetts, with cast iron compression members and joint blocks to unite them, was wrecked by the failure of one of these blocks; this brought cast iron as a material for bridges into disfavor and our attention was directed to the construction of these members of wrought iron, as were the tension members. Also, an attempt was made to develop a general design which would permit the several members to be made of varying sections and consequent strength, and kept in stock, from which a bridge of given span, a multiple of the panel length, could by selection and assemblage of these parts be quickly supplied. One of the features consequent upon this discussion was the design of a polygonal section for compression members, made up of four or more parts of wrought iron, to be riveted together, each alike and easily rolled. Entirely disconnected from these investigations, a quite similar design was afterward introduced, known first as the "Linville" and then the "Phoenix"—and has largely prevailed since—whereby wrought iron displaced cast iron in bridge construction. There was, however, no demand for iron bridges at that particular time, and the company engaged in the construction of ordnance and muskets, which continued until after my connection with it ceased.

It was then, as now, important to know what was the strength of the materials used in construction—in print, however, there was little of authority to guide; certain English hand books contained tables showing the strength of English wrought iron and cast iron, but quite inapplicable to American products—choice selections of which were then the stronger, and since in increasing quantity have had acknowledged superiority. Physical tests were necessary; a crude machine was made, costing perhaps all told $250; it consisted of a frame and connected levers, oscillating on knife edges—and on the outer end of one, weights were imposed—the whole was mostly of wood, the levers being trussed with iron rods, and the bearings were of cast iron and steel. In this, full-sized bridge members could be subjected to a stress of perhaps fifty tons, and the extensions measured; quite sufficient for most of the parts then constructed. This machine was one of the first of so large capacity constructed, and consequently its use was in demand by persons from quite distant points. . . . . .

Some time before 1860 Mr. Peter Cooper, an active and inspiring member of the firm of Cooper & Hewitt, engaged in the manufacture of wrought iron beams. At this date the greatest depth of those made was 6 in. The United States Government became interested and instituted an examination as to their transverse strength and deflections, and had placed on the grounds of the company a hydraulic testing machine of complicated design, to establish these data. The examinations were made under charge of Maj. Robert Anderson, U. S. A., afterward Gen. Anderson, of Fort Sumter fame. The first record of the tests made, which, because of limitations of the machine, was of beams not more than 10 ft. long, which came to me, was by the courtesy of W. A. Roebling (class 1857) and in his hand; no printed publication had yet been issued.

Engineers of the present day engaged on structural work scarcely know the difficulties to be overcome by the early designers. But few "shapes" were then in market, and those made by one manufacturer differed in section from those made by another manufacturer; the careful designer had to compute the moment of inertia of each section he used—in time, by his own effort and by exchange, he accumulated quite a comprehensive list; copies of which in manuscript I still possess. . . .

In conclusion—referring to the service of Mr. Whipple, particularly by the publication in 1847 of his little treatise, establishing the art of American bridge construction—which in my judgment, anticipated at his early day most that those who followed have in repetition elaborated, this incident seems pertinent. During 1876 a Russian engineer, and professor in a Moscow technical school, was sent by his government to study iron bridge construction in this country. After months spent in visiting the larger bridges and bridge works, for which extraordinary facilities had been granted him, he called on me to say "Good bye." I inquired as to the results of his observations, and among other things, in his reply he asked why American engineers uniformly employed German methods in computing bridge stresses; I replied by showing him Mr. Whipple's book, in which the methods referred to were developed with clearness and accuracy before the German writers were students.

The Nile Dam at Assouan.

For some time the plans to dam the Nile have been completed* and it is stated that work will be commenced at the first cataract at Assouan as soon as the floods have subsided. Sir Benjamin Baker, who has been prominent in advancing the enterprise, will go to Egypt to direct the engineering work.

The river at Assouan is about a mile wide and is broken by islands, dividing the water into many shallow streams. At one or two places only the water runs deep between the islands, but the Nile at this place by no means fulfills the popular conception of a cataract. So far as strength and economy of foundation are concerned the site leaves nothing to be desired. The rock throughout is hard, compact syenite or quartz diorite, and the river is so wide and shallow that the foundations of the larger part of the dam can be put in dry. The under sluices will be built upon reefs projecting over the water surface, both in summer and winter, so that the foundations will be open to annual inspection. As to the extent of the work, Sir Benjamin Barker says: "The flood discharge of a river a mile wide and 30 ft. deep, flowing at high velocity, must pass through the dam's sluices at the rate of 15,000 tons of water per second, i. e., 900,000 tons a minute, or more than 50,000,000 tons of water an hour. At times the water will be dammed back 66 ft. above its pressed level, and for a distance of 144 miles above the dam."

It is a matter of more than passing interest that the same quarry which supplied the material for the temples of Philæ 3,000 years ago, will furnish the granite for this enterprise.

A driveway 40 ft. wide will be made on the dam. On the western side there will be a chain of locks leading from the upper to the lower levels. Each lock is to be 150 ft. in length, with an average rise of 50 ft.

To the Egyptian, the chief interest in this undertaking lies in its money value. The total land which it will be possible to cultivate will be increased some 600,000 acres, besides bringing under constant cultivation the whole of that land, which is now under yearly irrigation only. It is estimated that this work will be the means of increasing the value of the crops in the newly watered area about $30 an acre annually.

The cost of the dam alone is estimated to be $6,950,000, but the entire cost will be nearly $25,000,000, which is to be paid by the Egyptian Government in yearly installments extending over 30 years, but the payments are not to begin until the receipts from the reservoir give a margin of profit.

TECHNICAL.

Manufacturing and Business.

The E. S. Stiles Press Co. of Watertown, N. Y., has opened an office in charge of C. Lester Cullingworth at 243 Centre street, New York.

Capt. Alfred E. Hunt of the Pittsburgh Reduction Co., Pittsburgh, who went to war with Battery B of Pittsburgh, has returned. His health has been injured more or less by exposure, and he has suffered from malaria, but is now recovering rapidly.

The Pittsburgh Reduction Co. of Pittsburgh has received an order from the Russian Government for 50,000 lbs. of aluminum for use in accoutrements for the army.

Articles of incorporation have been filed by the Los Angeles Machinery Co. The incorporators are: B. F. Williams, Walter Jones, Charles N. Williams, Theodore E. Eisen and C. Leonard. The capital is $10,000.

The American Turret Lathe Works Co. has been incorporated recently in the state of Ohio with a capital of $50,000. The incorporators are: Adolph Pluemer, Charles F. Dolle, Louis J. Dolle, John W. Pluemer, John W. Sullivan and C. M. Conradson. The company will make turret lathes, under the patents of C. M. Conradson, and other machine tools. The principal offices of the company will be in Cincinnati, O., with selling office in Chambersburg, Pa.

W. P. Elliott, Manager of the Pneumatic Gate Co., of Chicago, reports that the company has recently made a shipment of railroad crossing gates to Holland, and that these will be the first gates of this character ever installed in that country.

A few months ago the Lidgerwood Mfg. Co., New York, furnished a small traveling cableway for use in the building of fortifications at Fort Pickens, Fla. Lieutenant James P. Jervey, the engineer in local charge, was able with this cableway to handle an average of 880 tons per day for 14 days, the maximum day's work being 1,000 tons. We give the record of each day's work in skips, the average weight of each skip being 2⅛ tons. June 14, 343; 16, 371; 17, 364; 18, 368; 20, 342; 21, 301 (two hours' delay); 22, 406; 23, 364; 24, 416; 25, 440; 27, 416; 28, 448; 29, 464; 30, 440. This record shows that it is sometimes more advantageous to run a light load fast than a large load slowly.

The Peerless Rubber Mfg. Co. has issued a lithograph of the battleship Oregon, a copy of which will be sent to any engineer requesting it. The print has the following inscription: "This 'Peerless' ship made

* See Railroad Gazette, April 8, 1898, p. 261; May 13, 1898, p. 345, and June 3, 1898, p. 396.

a run of more than 13,000 continuous miles and went into action at Santiago—a whole fleet in herself—without having to undergo any repairs. She was fitted in all her joints with Rainbow packing, Eclipse gaskets, and piston and valve rods packed with Peerless packing." The address of the company is 16 Warren street, New York.

Robert Wetherill & Co., Chester, Pa., builders of engines and boilers, have awarded a contract for a new foundry 146x65 ft., to Alva R. Kerr & Co., of Eddystone, Pa.

The City Council of Waukegan, Ill., has let the contract for dredging the channel in the harbor to Calkins, Stickney & Cram of Detroit. The channel is to be 66 ft. wide in the outer harbor and 120 ft. wide at the city docks, and will approach the new belt line slip, which will be 16 ft. deep. The work is to be done this fall and the full depth must be attained by May 1, 1899.

McCord journal boxes and lids will be used on the 250 cars ordered by the Continental Fruit Express Co. from Wells & French, and mentioned in our issue of last week.

H. A. Bowen, who resigned several weeks ago as Master Mechanic of Swift & Co., has been appointed Superintendent of the Bettendorf Axle Co., with headquarters at Davenport, Ia.

The Santa Anna Water Power Company of Gonzales has been incorporated in Texas to build and maintain a dam across the Guadalupe River, near the city of Gonzales, and to rent the water power obtained. The incorporators are R. S. Stillworth, F. R. Starr, Jr., C. T. Rather, G. W. Betts and J. W. Nixon.

Iron and Steel.

Bids ranging from $133,387 to $255,000 have been opened for the building of a United States coaling station at Pago Pago, Samoa. The contract has not yet been let.

Articles of incorporation were filed with the Secretary of State of New Jersey, Sept. 9, by the Federal Steel Co. The company is capitalized at $200,000,000, consisting of one million shares each of preferred and common stock, the par value being $100. The preferred stock is to receive non-cumulative dividends of 6 per cent. per annum, beginning Jan. 1, 1899, to be paid before dividends shall be given to the holders of common stock. In case the corporation is dissolved, the holders of preferred stock are to be entitled to the par value of their holdings before the holders of the common stock receive anything. The incorporators are: Charles C. Cluff, Charles McVeigh and Benjamin C. Van Dyke, all of 60 Grand street, Jersey City, where the office of the Corporation Trust Co., through which the Federal Steel Co. was organized, is located. The incorporation papers set forth that $3,000 has been paid in. The corporate office of the company will be at 60 Grand street, Jersey City.

It is stated that the Vandalia Line has contracted for 2,000 tons of 85-lb. rails for November delivery, to replace old 60-lb. rails on the main line.

Ground has been broken for an addition to the boiler house and for an additional blooming mill at the plant of the Lorain Steel Co., Lorain, O.

New Stations and Shops.

The Chicago & Northwestern has let a contract for the building of a new station at Green Bay, Wis., to the Charles W. Gendle Co. of Chicago.

According to the Seattle, Wash., Post-Intelligencer, plans in detail for the improvement of tide land property recently purchased by the Great Northern Railway Co. at Smith Cove, including the building of two 1,000-ft. docks, warehouses and a wheat elevator, are expected to reach Seattle soon. A. R. Cook is making soundings and preliminary surveys. Supplies are being purchased by the Great Northern, preliminary to beginning the work of dredging out the 2,000-ft. ship channel.

The New York, New Haven & Hartford is to build a large wharf at New London. The shore end will be where the present Providence & Stonington wharf is situated, south of the ferry landing. It will cover 100,000 sq. ft., and will be roofed.

The Renewal of Rails.

The Holland Company of Pittsburgh sends us a circular describing somewhat the work which that company is prepared to do in the way of resawing old rails. The company saws off the bad ends and redrills, and has a capacity for treating in this way 200 tons a day. It is also prepared to re-roll old rails to smaller sizes. The circular shows engravings of photographs taken from a lot of 6,000 tons of rails sawed and drilled for a trunk line. The rails so treated are callpered and the heights are marked to thirty-seconds of an inch on each rail and the rails of any one size are kept together; thus they can be assembled in the track as easily as new rails. The crop ends are sold and the returns deducted from the cost of resawing. Where the amount of rails to be treated is large enough, machinery will be moved to any convenient point. The company has built a plant at Wheatland, Pa., exclusively for this work, and has contracts in hand sufficient to keep its plant full for some months.

Driving Nails with a Pneumatic Hammer.

Mr. J. Elder, Master Mechanic of the Rock Island & Peoria Ry., has found that it is economy to drive nails with a pneumatic hammer in freight car building and repair work. By using a countersunk head and a No. 2 Boyer hammer Mr. Elder states that two men can drive as many nails as four can drive by hand. One man simply starts the nails and the other follows and drives them home.

A German Tap Idea.

It occurred to a German machinist that it would be advantageous to facilitate sharpening of taps, after they were dulled, by radial grinding, and this facilitating is proposed to be effected by throafing out the

flutes as shown in the cross-sections here. Whether the game is worth the candle remains to be seen. Those who got up the idea say yes. Of those who did not, opinion is divided. "The way to find out if a match is good is to strike it."

Electric Railroads in London.

The capital for the Great Northern & City, providing a new and much needed access for Great Northern suburban passengers, has at length been secured, and the work will now go forward at once. A prospectus, inviting subscriptions for a line from South Kensington to Piccadilly Circus, was put forward recently and withdrawn, as the public failed to subscribe. But in this case, too, it is now said, the money will be found and the scheme pushed on before long. For further particulars see the Railroad Gazette, Sept. 9, p. 646.

Wilmington Harbor Improvement.

General W. F. Smith, United States Engineer at Wilmington, received instructions from Washington Sept. 9 to advertise for proposals for making the improvements to the Wilmington harbor provided for by the last Congress. The bids will be opened Oct. 10 at the Engineer's office in Wilmington. The specifications call for a channel 150 feet wide and 18 feet deep at low water, from the mouth of the Christiana River to the Delaware Pulp Works, above the city of Wilmington, and from there to the Philadelphia, Wilmington & Baltimore Railroad bridge a channel 10 feet deep, and from the bridge to Newport a channel 7 feet deep, which will require the removal of several shoals. The work will cost about $200,000.

Why Air Brakes Are Cut Out.

The following is a report, furnished by Mr. Thomas, of air brake cars cut out on the Nashville, Chattanooga & St. Louis Railway, for August, 1898:

Number of air brake cars forwarded		4,281
Number of air brake cars O. K.		4,268
Air brake cars cut out		13
Average serviceable air brake cars to train		8.43
Of the 13 cars cut out, there were:		
Triple valves blowing at exhaust—		
Air Brake Company No. 1		1
Air Brake Company No. 5	1 Total	2
Emergency in service application—		
Air Brake Company No. 1		2
Triple valves out of order—		
Air Brake Company No. 3		8
Triple valve body broken		1
Total		13

Of the 13 cars cut out—

3 belonged to railway companies.
10 to private car lines.

Of the air brake cars forwarded—

267 were equipped with apparatus of Air Brake Company No. 1.
6 with apparatus of Air Brake Company No. 2.
15 with apparatus of Air Brake Company No. 3.
3,989 with apparatus of Air Brake Company No. 5.
4 with apparatus of Air Brake Company No. 6.

The Fall of the Bridge Over the St. Lawrence.

We had hoped (but hardly expected), to be able, by this time, to give some explanation of the disastrous wreck of the bridge of the New York & Ottawa Company over the St. Lawrence at Cornwall. The cause remains a mystery, and perhaps it always will. Owing to the swiftness of the current, divers cannot be used, and investigation is necessarily slow, and perhaps it may be impossible to arrive at facts on which a conclusive verdict can be based.

New York Conduit Electric Roads.

On Wednesday of this week the actual construction work of converting the Sixth avenue line from Fifty-ninth to Fourteenth street, New York, to electric power was completed, and horse cars resumed running. The length, 4½ miles, was finished in 37 days after work was begun, and Mr. Vreeland states that this is a better record than any before obtained, even on trolley roads.

Work was begun at Bowling Green, New York, on Monday of this week, as the first step in changing the Broadway cable road into a conduit electric line. It has been known for some time that the cable lines worked by the Metropolitan Street Railway Co. would be changed to electric roads as soon as the preliminary arrangements can be perfected. The work for the most part will be done at night, thus interrupting but little the traffic on Broadway. There appears to be no opposition from property owners and the work will doubtless progress rapidly.

THE SCRAP HEAP.

Notes.

Buildings belonging to the Memphis Grain Elevator and the Eagle Mills were destroyed by fire at Memphis, Tenn., Sept. 8. Loss, $240,000.

The Southern Pacific now runs a freight train through daily each way between San Francisco, Cal., and Portland, Or., instead of tri-weekly as heretofore. The time through is 61 hours.

The list of railroad stations in the back part of the "Traveler's Official Guide," now fills 140 pages, having been reset in new and larger type. This is a very accurate and valuable list.

Agents of the New York Central, the Lake Shore and the Michigan Central have been notified that the freight cars of these three companies will hereafter be used in common, each road treating the cars of the others, so far as loading is concerned, precisely the same as though they were its own. The New York Central practically owns the other two roads.

On the evening of Aug. 31, the conductor and the engineman of express train No. 20 of the Pittsburgh, Cincinnati, Chicago & St. Louis were arrested at Urbana, O., for running through the city at a rate of speed faster than six miles an hour. The train was delayed 47 minutes while the men were taken before a magistrate. They pleaded guilty and the station agent paid their fines of $10 and costs each.

At Cincinnati, Sept. 7, 14 ticket brokers were arrested and fined $25 and costs each, for selling railroad tickets contrary to the city ordinance recently enacted, in which severe regulations were imposed. The brokers pleaded guilty, but paid their fines under protest. Ten other brokers were arrested for selling tickets on the street and were fined $10 and costs each. It is said that all of the cases will be appealed.

About 85 employees of the Metropolitan Street Railway, New York City, enlisted in the volunteer army for the war with Spain, and their fellow employees are now raising a fund of $2,000 to send those of them who are sick and disabled to the country for restoration of their health. To permit the collection of this money, President Vreeland temporarily suspended the rule forbidding the solicitation of money among the employees.

The Federal Labor Commission.

President McKinley has announced the names of the nine men appointed by him as members of the commission to investigate the "labor problem," which was provided for at the last session of Congress. They are: Andrew L. Harris, S. N. D. North, Frank P. Sargent, Ellison A. Smythe, John M. Farquhar, Eugene D. Conger, Thomas W. Phillips, Charles J. Harris and M. D. Ratchford. Mr. Harris was Lieutenant-Governor of Ohio when Mr. McKinley was Governor. S. N. D. North of Massachusetts is an expert in tariff and commercial statistics. He is Secretary of the National Wool Manufacturers' Association. Mr. Sargent has for some years been at the head of the Brotherhood of Locomotive Firemen. Mr. Conger of Michigan is editor and proprietor of a Grand Rapids newspaper. The principal duties of the commission will be to collect data and consider problems presented by labor, capital and agriculture; to settle differences between capital and labor, and recommend legislation. The commission will consist of 19 members, five of whom will be members of the House, five Senators, and the nine named by the President. Senator Kyle, who is Chairman of the Senate Committee on Education and Labor, will be Chairman of the Commission.

The New York Special Commerce Commission.

The special commission recently appointed by the Governor of New York to consider the actual or threatened decline in commerce at New York City was organized last week. The President is Hon. Charles A. Schieren, and the Secretary is Alexander H. Smith. Among the subjects to be considered by the commission are: Deepening the channels of the Port of New York, dock rentals, port charges, pilot fees, availability of the water front above Hell Gate and beyond Fort Hamilton, warehouse facilities, grain elevator charges, differential charges of railroads, lighterage system, bearing of the Erie Canal on the commerce of New York, status of Canadian canals with reference to New York commerce, Western demarkation line contributory to New York, comparison of charges, New York and other ports, and complete statistics of New York commerce.

Three English Train Accidents.

From Leyland, England, we have the very unusual news that a locomotive engineman has been convicted of manslaughter, convicted and sent to prison. He was running an excursion train.

At Pont Shon Norton in South Wales a train was derailed, apparently by an obstruction intentionally placed on the line. This is a class of accident which in England is very rare.

The last Board of Trade report contains an account of Major Marindin's investigation of a firebox explosion at Antrim, Ireland, on the Belfast & Northern Counties Road. It appeared that a number of staybolts had been fractured for some time and that the firebox and boiler had not been inspected with sufficient frequency. The company has now decided to have all boilers examined once a week. In this accident the engineman and fireman were killed.

Railroad Taxes in Arkansas.

The Arkansas State Board of Equalization reports the valuation of railroad property in the state for taxation the present year, including the sleeping car, telegraph and express companies, as $22,995,492. The length of the railroads in the state is 2,612 miles, 65 miles greater than in the preceding year, and the increase in valuation is $371,628.

The Heaviest Lake Load.

The steamer George Stephenson, in its last voyage from Duluth to Lake Erie, towed two barges loaded with iron ore; and the load of the steamer and the barges combined amounted to 19,761 net tons, the largest quantity of ore ever moved on the lakes by a single engine.

The Stationary Engineers at East Pittsburgh.

On the occasion of the 17th annual convention of the National Association of Stationary Engineers at Pittsburgh last week about 400 members of the Association, with 200 of their wives and sisters, were entertained by the Westinghouse Machine Company and Westinghouse, Church, Kerr & Co., on an excur-

sion to the Westinghouse shops at East Pittsburgh, and at Wilmerding. The excursion took place on the afternoon of Sept. 7 and the hosts gave each member a programme which described the principal features of the shops in such a clear way that the visitor could see and understand nearly everything without asking many questions. In the evening there was a banquet in the erecting room of the Westinghouse Machine Company at the East Pittsburgh shops, which had been cleared for the purpose. Over 700 people sat down to the banquet.

Iron Pier Wrecked.

The new iron pier which was being built by the city of New York for the Wilson line was partially destroyed by a stroke of lightning on Thursday of last week. The pier was to have cost complete $250,000; the damage will amount to about $50,000. It will be 800 ft. long complete, and the iron framework for 400 ft. had been completed. Two men were killed and 13 injured by the accident.

Vice-President Section D, A. A. A. S.

In our issue of Sept. 2, page 624, in the report of the last meeting of the American Association for the Advancement of Science, it was stated that Professor J. J. Flather was elected Vice-President of Section D. We are informed, however, that Professor Storm Bull of the University of Wisconsin was elected to this office.

Yellow Fever.

It appears that the railroads in Tennessee, Mississippi and Alabama have suffered considerable interruption of passenger traffic in consequence of the yellow fever scare. Reports from Memphis indicate that a good many passenger trains were taken off and that many towns established partial or complete quarantines and forbade the stopping of passenger trains within the village limits. Some country merchants bought goods at Memphis, instead of at New Orleans, on account of the absence of what were believed to be suitable restrictions at the latter city. The through lines from the North have, however, continued to assure passengers that through travel was not interrupted, and it would appear that the alarm concerning the possible spread of the fever has already greatly abated.

The Hudson River Tunnel.

Chancellor McGill of New Jersey has ordered the sale of the property of the Hudson River Tunnel Company, under the suit of the Farmers' Loan & Trust Company, trustee for the bondholders. It is stated that the bondholders will buy in the property and reorganize. Not much work will be required to finish the single tunnel which was partially built several years ago.

Civil Engineers for the Navy.

Thirty-five candidates have appeared for examination for appointments as civil engineers in the navy. There is one vacancy, that created by the retirement of Civil Engineer Menocal, but there will probably be three or four appointments made.

Calcium Carbide and Acetylene in France.

There are no official statistics bearing upon the annual output of calcium carbide, so that the amount furnished yearly by the different manufacturers has to be estimated. These estimates vary from 1,000 to 5,000 tons per year from each factory, depending upon the demand and the number of hours each establishment works. There are ten factories at present engaged in the manufacture of carbide of calcium in France. Four factories are undergoing construction. They will be able to produce from 2,500 to 3,000 tons per year. The wholesale price of carbide of calcium in France is from 350 to 400 francs ($67.55 to $77.20) per ton. The carbide of calcium manufactured in France is guaranteed to give 300 cubic liters of gas per kilogram. The output is constantly increasing, and the supply is fully equal to the demand. There are two villages in France completely lighted by acetylene, by the Société Franco-Espagnole du Gaz Acétylène, of No. 81 Rue St. Lazare, Paris. They are Alzonne, in the department of Aude, a town of 1,506 inhabitants, and Saurat-par-Tarascon, in the department of Ariege, a place of 3,024 inhabitants. A large consumer of calcium carbide says that as long as the American manufacturers do not furnish a better article of calcium carbide than they are now doing, and continue to insist upon payment in advance, there will be little chance of importing any from the United States into France.

The Traffic of the Soo.

The following is the official report of freight and passenger traffic to and from Lake Superior for the month of August, 1898, including statistics of the United States and Canadian canals at Sault Ste. Marie, Michigan and Ontario:

EAST BOUND.

Items.	Designation.	U. S. Canal.	Canadian Canal.	Total.
Copper	Net tons.	12,921	400	13,321
Grain	Bushels.	1,675,570	222,106	1,897,676
Building Stone	Net tons.	526	.....	526
Flour	Barrels.	889,340	61,280	950,620
Iron Ore	Net tons.	1,635,989	299,942	1,935,931
Iron, Pig	Net tons.	2,183	.....	2,183
Lumber	M ft. B.M.	136,148	1,470	137,618
Silver Ore	Net tons.	.....	.....	.....
Wheat	Bushels.	1,084,943	328,134	1,413,077
Unclassed freight	Net tons.	26,280	7,525	33,805
Passengers	Number.	3,661	3,262	6,923

WEST BOUND.

Items.	Designation.	U. S. Canal.	Canadian Canal.	Total.
Coal (hard)	Net tons.	76,759	6,837	83,596
Coal (soft)	Net tons.	421,761	87,449	509,210
Flour	Barrels.	.....	.....	.....
Grain	Bushels.	1,900	1,000	2,900
Manufactured iron	Net tons.	29,328	1,528	30,856
Salt	Barrels.	34,070	954	35,024
Unclassed freight	Net tons.	41,895	5,803	47,698
Passengers	Number.	5,159	2,889	8,048

East bound freight, net tons			2,367,748
West bound freight, net tons			677,292
Total freight, net tons			3,045,040
Total craft—United States		1,958	
Total craft—Canadian		614	2,572
Total registered tonnage—United States		2,244,042	
Total registered tonnage—Canadian		363,410	
			2,607,452

"Jim Crow Cars" for South Carolina.

The new law passed by the Legislature of South Carolina at its last session, providing for separate coaches, or divided coaches, for white and black passengers, went into effect Sept. 1. Some of the roads met the requirements of the law without putting on additional cars, a partition being placed in the first and second-class coaches formerly used. The accommodations are thus made "equal" beyond cavil and the races at the same time are effectually separated.

Information from Australia.

There has been a mysterious disappearance of half a dozen locomotives from the Victorian Railway stocks. The theft of engines is comparatively common in America. The private ownership of railways there has given rise to bitter feuds between some of the concerns, in connection with which sheds have been burgled, engines fired up and driven along the intersecting lines to the stealers' sheds, perhaps 1,000 miles away. Next day the stolen article would be taken to pieces and so transfigured that only the original builder would know it again.—Melbourne Age.

The Battleship Kasagi.

A force of Japanese naval officers and men, 200 in all, have just arrived in Philadelphia from Seattle (where they landed) to man the new battleship Kasagi, just completed at the yards of William Cramp & Sons for the Japanese Navy. The party stopped at Chicago, and the officers were the guests of Mr. P. B. Weare. They were taken for a drive through the parks and entertained at the Union League Club.

Railroad Tax Valuations in Missouri.

The State Auditor of Missouri has just completed the work of tabulating and apportioning the values fixed by the State Board of Equalization upon railroad, bridge and telegraph property for taxes of 1898. The aggregate value of the several classes is as follows:

Steam railroads, 6,554 miles	$76,012,925
Railroads other than steam, 541 miles	9,507,174
Bridges	2,725,000
Telegraph lines	1,514,594
Private car lines	1,884,200
Total	$91,643,894

The aggregate assessment by the board for taxes of 1897 amounted to $79,436,396. The assessment for taxes of 1898 includes, for the first time, the value of street railroads, heretofore assessed by the local authorities.

Railroad Tax Assessments in Colorado.

The State Board of Equalization reports the total railroad valuation in Colorado for 1898 to be $32,199,850, an increase of about $125,000 over last year. The street cars are assessed at the same figure as in 1897, $1,219,813, while the foreign cars are valued at $267,280, a substantial advance over the previous year. The assessment is made up as follows:

Railroads	$31,270,147
Sleeping cars	477,311
Telegraph	215,997
Telephone	236,395
Total	$32,199,850
Street cars	1,219,813
Foreign cars	267,280
Grand total	$33,686,943

The Western Railroad of Havana.

A press dispatch of Sept. 8 states that Messrs. Pearson, Simpson and Vandama, respectively Administrator, Engineer and Inspector of the Western Railroad of Havana, have gone to the province of Pinar del Rio to make surveys for an extension of the road to the western end of Cuba, passing through San Luis, San Juan and Guane. From the present terminus of the road at Pinar del Rio the distance to Guane is about 30 miles.

Vanderbilt Fast Freight Lines.

The consolidation of offices of the different Vanderbilt fast freight lines appears to have begun. It is reported that General Manager Wilson, of the West Shore and Nickel Plate lines, and General Manager Pomeroy, of the White Line, and the agents of the different lines in Louisville, Dayton, Cincinnati, Columbus, Peoria and Indianapolis held a conference last week; and subsequently the following appointments were published in the newspapers:

Cincinnati—W. S. Morrill, White Line, Agent, William Applegate, Nickel Plate, Traveling Agent, and J. L. Todd, West Shore, Contracting Agent.

Dayton—George Kendrick, White Line, Agent, and J. S. Hardy, West Shore, Traveling Agent.

Louisville—B. Dudley, White Line, Agent, and W. B. Wheeler, West Shore, Traveling Agent.

Peoria—L. L. Thurston, White Line, Agent, and H. A. Whitney, West Shore, Traveling Agent.

Columbus—George Chamberlain, White Line, Agent, and J. E. Kane, West Shore, Contracting Agent.

Indianapolis—L. J. Blaker, White Line, Agent, and John Simmons, West Shore, Traveling Agent.

LOCOMOTIVE BUILDING.

The Wiggins Ferry Co. will order one locomotive, probably this week.

The St. Louis Stock Yards will order one locomotive, probably this week.

The McCloud River has given an order to the Baldwin Locomotive Works for one locomotive.

The Centralia & Chester is having one engine built by the Pittsburgh Locomotive & Car Works.

The Baldwin Locomotive Works are building one engine for the Imperial Chinese Railroads.

The Baldwin Locomotive Works are building one locomotive for the Chattanooga, Rome & Southern.

The Western of Mexico is reported to be in the market and about to ask bids on some locomotives.

The Detroit & Mackinac has placed an order for one engine with the Pittsburgh Locomotive & Car Works.

We are reliably informed that the Atchison, Topeka & Santa Fe is considering buying 15 heavy consolidation engines and that the matter was being settled at time of going to press.

CAR BUILDING.

The Chicago & Northwestern is in the market for 400 coal and 150 flat cars.

The St. Louis Southwestern has placed an order with the St. Charles Car Co. for 200 box cars.

F. M. Pease (Incorp.), Chicago, has placed an order with the Wagner Palace Car Co. for one sleeping car for private use.

We are informed that the Northern Pacific has decided not to increase its order for cars as stated by a contemporary last week, owing to the inability of builders to make quick deliveries.

It is reported that the Kansas City, Pittsburgh & Gulf has placed the order for the 550 cars referred to last week with Barney & Smith Car Co. We were unable to confirm this at time of going to press.

In reference to a report published by a contemporary to the effect that the Santa Fe Pacific will build 400 freight cars at Albuquerque, N. M., we are officially informed that there is no truth in this. The Atchison, Topeka & Santa Fe is building only some hopper bottom coal cars at Topeka, to replace vacant numbers, and does not contemplate buying more cars at present.

Work has been commenced at the West Milwaukee shops of the Chicago, Milwaukee & St. Paul on 250 60,000-lb. vehicle cars for October delivery, which are being built at the rate of 10 a day. These cars will weigh 37,900 lbs., and will be 50 ft. long, 9 ft. 5 in. wide, and 13 ft. 11¾ in. high. They will be equipped with Westinghouse air brakes, double board roofs, Barber trucks, M. C. B. couplers, Drexel pressed steel journal box lids, iron axles, double iron bolsters and filled shell brasses. The railroad company's standard brake beams, doors, door fastenings, draft rigging, journal boxes and wheels will be used.

As mentioned in our issue of last week, the Chicago, Burlington & Quincy has ordered 600 80,000-lb. gondola coal cars, 300 from the Wells & French Co., and 300 from the Michigan-Peninsular Car Co. These cars are for 1898 delivery. They will be 35 ft. 10 in. long inside, 9 ft. 1 in. wide inside, and 7 ft. 3⅝ in. high from top of rail to top of sides, and will weigh 28,400 lbs. The flooring and sides will be of wood; the trucks will be of the C., B. & Q. standard diamond frame, with C., B. & Q. standard body bolsters; wooden single truss brake beams, C., B. & Q. draft rigging, and bronze brasses, and all castings will be of malleable iron conforming to the standards of the road. Westinghouse air brakes, Congdon brake shoes and Chicago couplers will be used.

The Northwestern Elevated of Chicago, is preparing plans for some motor cars and trailers, of which about 30 motor cars and 100 trailers will probably be ordered. Work is now progressing on the designs of the car bodies, but the question of the trucks to be used on the motor cars has not yet been settled.

BRIDGE BUILDING.

ALBANY, N. Y.—The New York Central & Hudson River has asked the State Railroad Commissioners for authority to build bridges at Spencer street and Livingston avenue, and to elevate its tracks from the present depot yard to the Broadway viaduct.

ALLENTOWN, PA.—Former Burgess J. B. Kemerer has presented the Court of Lehigh County a petition asking for the appointment of viewers for a new overhead bridge to cross the Lehigh River between West Bethlehem and South Bethlehem. The proposed new bridge would cross the tracks of the Lehigh Valley and North Pennsylvania railroads.

CARLISLE, PA.—Jas. Jackson, Joseph A. Stuart and A. B. Rupp were appointed viewers to determine the necessity of a bridge at Zinn's ford on the line of Cumberland and York counties.

CHICAGO, ILL.—Attention has again been called to the bridges by City Engineer Ericson, who has made a detailed report to Commissioner of Public Works McGann on the condition of the 58 bridges and 38 viaducts in the city, in which he points out that the appropriation for repairs and maintenance has steadily declined since 1891, when $150,000 was set aside for this purpose, until 1898, when the appropriation was only $85,000. As the appropriation for this year is now entirely exhausted all repair work has been stopped, and unless the City Council makes an emergency appropriation no more work can be done this year, although the report gives a list of nine bridges on which repairs costing $12,500 are urgently needed, and of six viaducts for which $48,700 is needed at once. In addition to the detailed statement of repairs needed (only one bridge being reported in good condition), the report says: "It should be remembered that as the structures are growing older the cost of repairs and maintenance increases, and they will be rapidly destroyed. Some of the structures are veritable relics, having practically outlived their usefulness, and will shortly become a menace to public safety unless attended to without delay. The proper remedies in these cases are new structures of modern design. The great majority of bridges, and especially the viaducts, have not been painted for a number of years, and they are gradually being destroyed for lack of proper attention."

DECATUR, ILL.—An iron bridge will be built at Decatur at a cost of about $2,000, according to reports.

DETROIT, MICH.—The Board of Public Works has decided to double deck the Belle Island bridge by building iron footpaths for the accommodation of bicyclists over the present paths. The improvement will cost about $15,000.

DULUTH, MINN.—The Duluth, Missabe & Northern has given a contract to the Wisconsin Bridge & Iron Co. for a bridge over the Cloquet River, to take the place of the present wooden one. The bridge, with approaches, will be 400 ft. long, with a center span of 165 ft. Another steel bridge will be built over the Duluth incline road at West Duluth, to take the place of a trestle. It will have two spans, each 50 ft. long.

ELYRIA, O.—Bids are asked until Sept. 22 on $175,000 of 4 per cent. bridge bonds. A. B. Hayes, Commissioner, Lorain County.

FRANKLIN, PA.—A county bridge is asked for over Plum Run on the road from Oil City to Collinsburg. T. L. Kennerdell of Franklin is one of the viewers appointed.

GOSHEN, N. Y.—The Erie will build a number of small bridges near Goshen. (See Railroad Construction Column.)

NEWTON, KAN.—It is stated that the Atchison, Topeka & Santa Fe will build two viaducts over its

tracks at West First street and Sixth street, Newton.

QUEBEC, QUE.—At the annual meeting of the Quebec Bridge Co., held at Quebec, Sept. 9, it was decided to call for bids for building the bridge, which will, it is estimated, cost from $3,000,000 to $4,000,000. The capital so far subscribed is $286,000. The report states that the Dominion Government has given assurances that a subsidy of 33⅓ per cent. on the cost of the enterprise would be voted at the next session of Parliament. It is expected that the province of Quebec and the city of Quebec between them will vote subsidies amounting together to another third of the cost, and the balance of the cost will be met by issuing bonds. It is the intention of the company to build and own the lines of railroad from the bridge into the city of Quebec, and also that from the south end of the bridge, which will connect at a concentrated point with all the railroads on the south shore. Mr. E. A. Hoare is Chief Engineer for the company.

UTICA, N. Y.—The Utica Suburban Ry. Co. operated under lease by the Utica Belt Line St. RR. Co., will build a steel bridge at Bradley street over the Erie Canal.

WALLA WALLA, WASH.—Bids will be received until Sept. 19 by the city of Walla Walla for building a wood or steel bridge across Mill Creek at Fourth street. C. N. McLean, City Clerk.

WELDON, N. C.—The Atlantic Coast Line, according to report, will build a bridge over the Roanoke River at Weldon.

RAILROAD LAW.—NOTES OF DECISIONS.

In New Jersey a passenger entered a train which was not scheduled to stop and did not stop at the station for which he held a ticket. He refused to pay additional fare to the next station, and upon arriving there was arrested on complaint of the conductor and subjected to considerable inconvenience before he was finally discharged. His arrest for such a reason was illegal, and there was evidence in a suit brought by him against the road that unnecessary violence had been used in making it. On the trial the court charged the jury that if they should find that the arrest was the result of "malice" on the part of either the conductor or the police officer (that is to say—to roughly define the technical word "malice" —an illegal act intentionally done without cause or excuse) they might render a verdict for a larger amount than would compensate the plaintiff for his injuries, as a punishment to the defendant. Accordingly, the jury brought in a verdict for a larger amount than they would have found if this instruction had not been given. The verdict is set aside on appeal, as the court holds that a case was not presented where punitive damages were proper; that the amount should have been limited to a reasonable compensation for the plaintiff's physical injuries and for the injury to his feelings resulting from the indignity to which he had been subjected. (Decided by the Supreme Court, July, 1898.)[1] As a rule, the law of any civilized jurisdiction seeks to give only just compensation for the natural and direct consequences of a wrong. In some extreme cases, however, where an injury is wanton or arises under circumstances of such gross neglect of duty or ignorance of law as practically to amount to wantonness, this rule of compensation is departed from and increased damages exacted as a punishment, as, for example, where a sick woman was illegally evicted from her house at night in a storm.[2] In Maryland an award of such damages has been sustained in a case presenting facts analogous to those presented in the action first noted here.[3]

In New Jersey, the court declares that, while it never disturbs a verdict merely because it would, in the place of the jury, have assessed the damages found at a different amount, it will set one aside as excessive when, in view of the testimony, it is so large as to justify the inference that it was reached as the result of passion, prejudice, partiality or corruption, without regard to the number of times the case has been tried. A child four years old had been killed by a street car, and, in an action brought by his administrator for the benefit of those entitled to share in his estate—which seems to have consisted wholly of the cause of action in question—a verdict for $5,000 was rendered. In the light of the foregoing rule the appellate court sent the case back for a new trial, at which a verdict for the same amount was again rendered. The court now sets aside the second verdict as excessive, again granting a new trial, and takes occasion to say, in answer to a contention of the plaintiff that it is an established practice never to disturb the second of two concurring
while it knows of no such practice, if it exists, it should certainly be abandoned. (Decided by the Supreme Court, July, 1898.)[4] One unfortunate result of such occasional failures of justice as are exemplified by the verdicts referred to in this paragraph is the natural temptation they furnish to general and vague criticism of the system of trial by jury. Such criticism is heard on all sides, but it may not be generally understood how exaggerated and half-considered it is in most cases. Anyone who wants light on this subject may find his questions satisfactorily answered in the admirable address of Mr. Joseph H. Choate, in defense of the jury system, delivered before the American Bar Association a few weeks ago. A good report is published in the Albany Law Journal of Aug. 27, 1898.

In Arkansas a certain railroad required freight conductors, when carrying passengers from stations where tickets are not sold, to collect fare to the first ticket station only and to notify them to provide themselves there with tickets to their destinations. This rule is held to be reasonable and lawful. Accordingly a passenger who refuses to comply with the rule cannot succeed in action to recover damages for being put off a train for that reason. (Decided by the Supreme Court, April, 1898.)[5]

In Massachusetts a railroad company acquired title to certain premises by condemnation. The former owner refused to yield possession of them until compelled by legal proceedings. In an action subsequently brought by him to have the amount of the award for the land fixed it is held that the company was bound to pay interest on the award from the day on which it took title to the premises in question until it was paid. (Decided by the Supreme Court, May, 1898.)[6] Doubtless, as is intimated in the opinion, the railroad company could recover compensation for such damages as they should show to have arisen from the refusal of the former owner to vacate, by a separate action for that purpose.

In 1865 a turnpike company, by authority of an act of Pennsylvania, purchased a bankrupt and worn-out street railroad, with its franchises, and tore up and removed the track from a street on which it had been operated, a portion of which street had been occupied by the turnpike. The company then executed a release reciting that, for the purpose of enabling the city to have absolute control of the street, it released to it all its turnpike lying thereon, and all its title, interest and corporate privileges therein, so that it should thereafter exercise no control over any portion of it. The city thereupon improved the street at a large expense, and in 1881 granted a franchise to operate a street railroad thereon to another company, which accordingly laid a track and continued to operate it without disturbance until 1892. In that year the turnpike company attempted to rebuild the old railroad, claiming a right to exercise the franchise purchased in 1865. The court holds that by the release to the city it relinquished both the turnpike and the street railroad privileges and, further, that even if this were not so, it had lost the right to use the franchise referred to by reason of its inactivity for so long a time, especially in view of the expense incurred by the city and the other company. (Decided by the Supreme Court, July, 1898.)[7]

In 1873 the Legislature of Minnesota passed an act[8] whereby it exempted a certain specified railroad, and all such other railroads in that state as should choose to take advantage of the provisions of the act, from all ordinary taxation, and provided instead that such railroad or railroads should pay to the state 3 per cent. of its gross earnings annually. The first mentioned road was bought in foreclosure proceedings by another company, and the court holds, on consideration of a contention that the immunity from taxation referred to did not pass to such other company by reason of the transfer, that such immunity was not merely a personal privilege of the company to which it was first granted, but appertained to the line of railroad itself and was transferred to any company which might acquire the road and assume its operation, ipso facto. (Decided by the Supreme Court, July, 1898, one judge dissenting.)[9]

1. Cane vs. Cent. of N. J., 40 Atl., 780.
2. Redfield vs. Redfield, 75 Iowa.
3. R. R. Co. vs. Larkin, 47 Md., 155.
4. Consol. T. vs. Graham, 40 Atl., 773.
5. McCook vs. Northrup, 45 S. W., 547.
6. Imbeschied vs. Old Colony, 50 N. E., 609.
7. W. Phil. Ry. vs. W. Turnpike Co., 40 Atl., 787.
8. Laws of 1873, Chap. 111.
9. Traverse Co. vs. St. P., M. & M., 76 N. W., 217.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Atlantic Coast Line.—Two per cent., payable Sept. 10.
Chicago & East Ill.—Preferred, quarterly, 1½ per cent., payable Oct. 1.
Chicago, Milwaukee & St. Paul.—Common, 2½ per cent.; preferred, 3½ per cent., payable Oct. 21.
New York Central & Hudson River.—One per cent., payable Oct. 15.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

American Academy of Railway Surgeons.—Meets at Chicago, Oct. 5, 6 and 7.
American Association of General Passenger and Ticket Agents.—Meets at Detroit, Mich., Oct. 18.
American Railway Association.—Meets at the Holland House, New York City, at 11 a. m. on Oct. 12.
American Society of Civil Engineers.—Meets at the house of the Society, 220 West Fifty-seventh street, New York, on the first and third Wednesdays in each month at 8 p. m.
Association of Engineers of Virginia.—Holds its formal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building, Roanoke, at 5 p. m.
Association of Railway Superintendents of Bridges and Buildings.—Eighth annual convention, Murphy's Hotel, Richmond, Va., from Oct. 18 to 20.
Boston Society of Civil Engineers.—Meets at 715 Tremont Temple, Boston, on the third Wednesday in each month at 7.30 p. m.
Canadian Society of Civil Engineers.—Meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.
Central Railway Club.—Meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.
Chicago Electrical Association.—Meets at Room 1737, Monadnock Building, Chicago, on the first and third Fridays of each month at 8 p. m. J. R. Cravath, secretary.
Civil Engineers' Club of Cleveland.—Meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.
Civil Engineers' Society of St. Paul.—Meets on the first Monday of each month except June, July, August and September.
Denver Society of Civil Engineers.—Meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.
Engineers' Club of Cincinnati.—Meets at the rooms of the Literary Club, 25 East Eighth street, on the third Thursday of each month, excepting July and August, at 7.30 p. m.
Engineers' Club of Columbus (O.).—Meets at 12½ North High street on the first and third Saturdays from September to June.
Engineers' Club of Minneapolis.—Meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.
Engineers' Club of Philadelphia.—Meets at the house of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month at 8 p. m., except during July and August.
Engineers' Club of St. Louis.—Meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.
Engineers' Society of Western New York.—Holds regular meetings on the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.
Engineers' Society of Western Pennsylvania.—Meets at 410 Penn avenue, Pittsburg, Pa., on the third Tuesday in each month at 7.30 p. m.
Freight Claim Association.—Meets at Mobile, Ala., Oct. 5.
Locomotive Foremen's Club.—Meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago.
Master Car and Locomotive Painters' Association.—Annual convention, Ryan Hotel, St. Paul, Minn., Sept. 13 to 16, both inclusive.
Montana Society of Civil Engineers.—Meets at Helena, Mont., on the third Saturday in each month at 7.30 p. m.
New England Railroad Club.—Meets at Pierce Hall, Copley Square, Boston, Mass., on the second Tuesday of each month.
New York Railroad Club.—Meets at 12 West Thirty-first street, New York City, on the third Thursday in each month at 8 p. m., excepting June, July and August.
Northwest Railway Club.—Meets on the first Tuesday after the second Monday in each month at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.
Northwestern Track and Bridge Association.—Meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.
St. Louis Railway Club.—Holds its regular meeting on the second Friday of each month at 3 p. m.
Southern and Southwestern Railway Club.—Meets at the Kimball House, Atlanta, Ga., on the second Thursday in January, April, August and November.
Technical Society of the Pacific Coast.—Meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.
Western Foundrymen's Association.—Meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.
Western Railway Club.—Meets in Chicago on the Third Tuesday of each month at 2 p. m.
Western Society of Engineers.—Meets in itz rooms on the first Wednesday of each month at 8 p. m., to hear reports and for the reading and discussion of papers. The headquarters at the Society are at 1736-1739 Monadnock Block, Chicago.

Western Society of Engineers.

The next meeting of the Western Society of Engineers, to be held in the society rooms, Chicago, Sept. 21, will be a "Ladies' Evening," and Mr. H. G. Prout, of the Railroad Gazette, will talk on "The Soudan and Recent British Campaigns There."

New York Railroad Club.

The first regular meeting of the fall season will be held at 8 o'clock p. m., Thursday, Sept. 15, 1898, at rooms of the American Society of Mechanical Engineers, No. 12 West Thirty-first street. Mr. W. S. Rogers will present a paper on the subject of "Cost Keeping and Accounting."

The Engineers' Club of Philadelphia.

A regular meeting of the Club—the first fall meeting —will be held on Saturday, Sept. 17, 1898, at 8 o'clock p. m. The topical discussion will be "On the Proper Proportions of Parts of Steam Engines." The following members will take part in the discussion: Messrs. James Christie, F. Schumann, W. S. Twining, Josiah Dow and J. H. Vail.

Railway Mail Clerks.

The United States Railway Mail Service Mutual Benefit Association held its twenty-third annual convention at Atlanta, Sept. 6. J. W. Brown of Atlanta was chosen President for the ensuing year. The next meeting will be held in St. Louis, Oct. 3, 1899. This Association is confined to railway postal clerks and is strictly a life insurance organization. The membership is now more than 4,000.

Western Railway Club.

The next meeting of the Western Railway Club will be held at the Auditorium Hotel, Chicago, Tuesday afternoon, Sept. 20. A paper will be presented by Mr. G. W. Scott, of the Pullman Company, entitled, "Heating Large Railroad Stations, Shops and Buildings." The topics for discussion have not as yet been selected. The banquet which is usually held in connection with the September meeting has been postponed until later in the fall.

The Railway Signaling Club.

At the meeting of this Club in Chicago last Tuesday evening the subject of standard designs for signaling apparatus was left in the hands of the committee to be reported on at a future meeting. It appeared, from the result of the letter ballot that had been taken that a majority of the members were in favor of action by the Club looking to the establishment of standard dimensions for common parts of signals and signal apparatus. The appointment of a committee on standard specifications was ordered.

Northwest Railway Club.

The first fall meeting of the Northwest Railway Club was held at the Ryan Hotel, St. Paul, Tuesday, Sept. 13. Mr. J. C. Barber, of the Standard Car Truck Co., Chicago, read a paper entitled, "Car Truck Construction and Repairs," and Mr. J. H. Goodyear, Chief Clerk to the Master Mechanic, Chicago Great Western, a paper on "The Proposed Consolidation of the Master Mechanics' and Master Car Builders' Associations." Mr. Goodyear's paper is the same as a letter which was published a short time ago in the Railway Age setting forth the reasons why the associations should not consolidate. It is needless to say that the best men of both associations do not agree with Mr. Goodyear.

The proceedings of the Northwest Railway Club for April and May have just been distributed. The April proceedings contain an illustrated description of the plant of the Illinois Steel Co. at South Chicago, Ill., by Messrs. P. E. Carheart and C. E. Stafford, of the Steel Co., which has to do especially with the rail and plate departments.

At the May meeting the officers elected for the ensuing year were as follows: President, Mr. Tracy Lyon, Master Mechanic, Chicago Great Western; First Vice-President, Mr. George Dickson, General Foreman Great Northern Railway; Second Vice-President, Mr. Henry Goehrs, Master Car Builder, Chicago, Milwaukee & St. Paul; Treasurer, Mr. A. Child, General Car Foreman, Northern Pacific; Secretary, Mr. T. A. Foque, Assistant Mechanical Super-

intendent, "Soo Line"; Assistant Secretary, Mr. F. B. Farmer, American Brake Co.

The topics discussed at the May meeting were: "What Is the Best Method of Tapping Boiler Sheets for Staybolts and the Best Method of Putting in Staybolts," and, "The Proper Proportion Between the Size of Cylinders, Heating Surface and Grate Area for Locomotives Burning Bituminous Coal."

PERSONAL

—Mr. Anthony Hayes, a prominent railroad contractor in Illinois, died at Rockford, Ill., Sept. 6. He was 69 years of age.

—Mr. Kenton Sanford, Superintendent of the Southern Division of the Adams Express Company, has been appointed General Agent at New York.

—Mr. Thomas A. Whitmore has been appointed General Manager of the Consolidated Cattle Car Company, with headquarters at Chicago. He was heretofore Traffic Manager of the company.

—Mr. John W. Shannon, inspector for the Westinghouse Air Brake Co., with headquarters in Buffalo, died in that city Sept. 10, aged 47 years. Mr. Shannon was connected with the Westinghouse Air Brake Co. for almost 20 years.

—Mr. Decatur Axtell, Vice-President of the Chesapeake & Ohio, has been selected by President Ingalls of the Cleveland, Cincinnati, Chicago & St. Louis, to represent that system on the Board of Managers of the Joint Traffic Association.

—Mr. John C. Sims, Secretary of the Pennsylvania Railroad Company and Superintendent of its Employees' Savings Fund, has left Philadelphia on his private car for a tour with his family through Canada to the Rocky Mountains and the Pacific Coast.

—Mr. J. B. Cox, who was lately appointed Chief Engineer of the Chicago Junction Railway, was an Assistant Engineer on the Chicago, Hammond & Western, which road was bought by the Chicago Junction. Mr. Cox succeeded Mr. C. W. Hotchkiss.

—Mr. B. V. Swenson, Assistant Professor of Electrical Engineering of the University of Illinois, has resigned to accept a similar position in the University of Wisconsin. Prof. Swenson graduated from the University of Illinois in the class of 1893, and was appointed an instructor in the electrical engineering department.

—Mr. T. Y. Dzushi, Chief of Finance and Manager of Stores of the Imperial Government Railroads of Japan, will sail from New York for England on the Campania, Sept. 17. Mr. Dzushi came to this country to investigate the methods employed by the railroads of America in conducting their financial and purchasing departments, and incidentally to examine railroad appliances. He attended the annual convention of the American Street Railway Association at Boston, last week. Mr. Dzushi will visit the principal railroad centers in Europe on his way East to Japan.

—Mr. H. R. Hobart, who has been the chief working editor of the Railway Age for the past 22 years, has retired from that office; and a sketch of his career, published in the Age for Aug. 26, states that he is to take up a less sedentary but more active life, which means, we understand, that Mr. Hobart will devote himself to his real estate interests and to enjoying himself a part of the time. This last is a thing which an editor cannot do, except as he enjoys his work, which sometimes gets to be a trifle monotonous. Mr. Hobart has always done good and conscientious work, and his wide circle of railroad acquaintances will miss him. As in his real estate business, he is going to seek lenders of money, rather than borrowers, his path will be in other fields.

ELECTIONS AND APPOINTMENTS.

Atlantic & West Point.—E. O. Pritchard has been appointed Contracting Agent at Atlanta. H. D. Ellis has been appointed Traveling Freight and Passenger Agent, with headquarters at Atlanta, Ga.

Baltimore & Ohio.—J. R. C. Wrenshall has been appointed Acting Division Engineer, Maintenance of Way, in charge of the Third Division, which extends from Cumberland to Grafton, vice Geo. L. Hall, resigned. His headquarters will be at Cumberland, Md.

R. C. Haase, heretofore Traveling Passenger Agent, has been appointed District Passenger Agent, with headquarters at Detroit, Mich.

Baltimore & Ohio Southwestern.—Frank Brown, Assistant to the Purchasing Agent, has been appointed Purchasing Agent, with office at Cincinnati. Vice President Peabody has heretofore performed the duties of that office.

Central of Georgia.—T. S. Moise, Superintendent of the Columbus & Birmingham Division at Columbus, Ga., has been transferred to the main division between Savannah, Macon, Augusta and Milledgeville, with headquarters at Savannah, Ga. J. T. Johnson, heretofore Train Master between Columbus and Birmingham, has been appointed Superintendent of the Columbus & Birmingham Division, succeeding Mr. Moise. B. C. Epperson, who was formerly Superintendent of the lines now under Supt. Moise, is tansferred to the lines above Macon, with headquarters at Macon, Ga.

C. W. Chears, heretofore Southeastern Agent of the Georgia & Alabama at Atlanta, has been appointed Commercial Agent at Columbus, Ga., succeeding W. E. Estes. A. W. Thomas has been appointed Traveling Freight Agent, Cincinnati, O.

Central of New Jersey.—Wm. Dods has been appointed Train Master of the Lehigh & Susquehanna Division in place of David Ross, assigned to other duties, with headquarters at Mauch Chunk, Pa.

Chicago, Milwaukee & St. Paul.—W. W. Hall, heretofore Commercial Agent at Cleveland, has been appointed Commercial Agent at Cincinnati, succeeding E. W. Keyes, Jr., transferred. Robert C. Jones, heretofore Traveling Passenger Agent at Cincinnati, has had his title changed to that of District Agent, with headquarters at the same point. He will have charge of the territory on the Panhandle west of Steubenville.

Geo. H. Foote has been appointed General Southern Passenger Agent, with headquarters at Kansas City. Carl K. Landis has been appointed District Passenger Agent at Kansas City, succeeding Mr. Foote.

Cleveland, Cincinnati, Chicago & St. Louis.—E. R. Bonnell has been appointed Chief Clerk to Superintendent of Car Service J. R. Cavanaugh. He succeeds R. E. Randerson, resigned.

Dexter & Newport.—At the annual meeting held in Dexter, Me., Sept. 7, Treby Johnson resigned as Director. The number of Directors is reduced to six. Mr. Johnson was elected Treasurer.

Florida East Coast.—W. J. Jarvis has been appointed General Agent, with headquarters at Key West, Fla. (Sept. 2, p. 638.)

Fort Worth & Denver City.—B. S. McClellan has been appointed Master Car Builder, with office at Fort Worth, Tex.

Illinois Central.—L. A. Washington, heretofore Assistant Superintendent of the Evansville District of the Louisville Division, with headquarters at Evansville, has been appointed Assistant Engineer of the Louisville Division, with headquarters at Henderson, Ky.

Kansas City, Pittsburgh & Gulf.—N. H. Chamberlain, Traveling Freight Agent at Kansass City, has resigned. E. R. Wrong has been appointed to fill the vacancy, with the title of General Traveling Freight Agent. Mr. Wrong was heretofore Chief Clerk in the office of General Agent Holcomb, Kansas City. He is succeeded by E. S. Jewett. E. H. Shauffler, heretofore Contracting Agent at Quincy, Ill., has been appointed Traveling Freight Agent of the Omaha, Kansas City & Eastern, with headquarters at Quincy. J. E. Murphy has been appointed Contracting Agent, succeeding Mr. Schuffler. J. R. Snodgrass, heretofore Live Stock Agent, has been appointed Traveling Freight and Live Stock Agent, with headquarters at Maryville, Mo. R. W. Lightburne, Jr., who was lately appointed First Assitant General Freight Agent, has been appointed General Freight Agent, with headquarters at Kansas City. (Aug. 19, p. 602.)

Lehigh Valley.—The office of General Road Master, held by Richard Caffrey at South Bethlehem, Pa., has been abolished. Mr. Caffrey has been appointed Engineer Maintenance of Way, with headquarters at the same point.

Minneapolis & St. Louis.—J. B. Rayne has been appointed Contracting Freight Agent, with headquarters at Minneapolis.

Oconee & Western.—J. H. Marvon, Auditor, has resigned. He is succeeded by W. H. Baumes, with office at Dublin, Ga.

Pittsburgh & Lake Erie.—Geo. H. Thompson has been appointed Traveling Passenger Agent, with office at Pittsburgh, Pa.

Plant System.—S. B. Paton, heretofore Commercial Agent at Montgomery, Ala., has been appointed General Agent at Tampa, Fla. He is succeeded by S. H. Dare at Montgomery, Ala.

St. Louis & San Francisco.—C. L. Fontaine has been appointed Traffic Manager, with headquarters at St. Louis. (Sept. 9, p. 655.)

Union Pacific.—A. K. Shurtleff has been appointed Division Engineer in charge of the lines in Kansas, succeeding Chas. Manhart, with headquarters in Kansas City. Garrett O'Neill, Assistant Superintendent at Evanston, Wyo., has resigned. He is succeeded by Geo. E. Baird, who will also have his headquarters at Evanston, Wyo., reporting to Supt. L. Malloy.

West Shore.—Edward A. Watson has been appointed New England Passenger Agent, with office at No. 300 Washington St., Boston. He succeeds Albert A. Smith, resigned.

Wisconsin Central.—E. G. Clark has been appointed Chief Clerk in the General Freight Department at Milwaukee. He succeeds V. L. Freeland, who was lately appointed General Agent at Cincinnati. E. H. Cutter, Train Master of the Ashland Division, has been appointed Train Master of the St. Paul & Wisconsin Division, with headquarters at St. Paul. He succeeds F. J. Hawn, resigned. W. F. Anderson has been appointed Train Master of the Ashland Division, with office at Ashland, Wis., succeeding Mr. Cutter.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

ALASKA ROADS.—A preliminary survey for the Yukon River & Northern Bay RR. is now in progress and will probably be finished during this month. The line is to begin on Norton Sound, above Fort St. Michael, and to run east about 120 miles to the Yukon River, cutting off 400 miles of difficult river navigation. (June 10, p. 420.)

ARKANSAS CENTRAL.—Grading is reported completed for five miles on the extension from Charleston, Ark., to Paris, 18 miles. The company expects to complete the line to Paris by the middle of October. (June 24, p. 466.)

ATLANTIC COAST LINE.—This company is reported to have determined to build a short branch from Weldon, N. C., east to Garysburg, including a bridge of its own over the Roanoke River.

Right of way is secured for altering a portion of the route of the Petersburg Division, by which the line will be shortened between Petersburg and Stony Creek.

BEAUMONT, WHARF & TERMINAL.—Judge West at Beaumont, Tex., has dissolved the injunction restraining this company from crossing the tracks of the Southern Pacific and track laying is resumed. (July 24, p. 466.)

BUFFALO, ROCHESTER & PITTSBURGH.—Work on the section between Butler, Pa., and New Castle, on the Allegheny & Western, from Punxsutawney, Pa., to New Castle, was begun this week. The route, which has been in doubt, is now determined. On the section between Punxsutawney and Butler about two-thirds of the grading is completed and nearly 10,000 men are at work. (Sept. 2, p. 638.)

CANADIAN PACIFIC.—The new short line between Ottawa and Montreal was formally opened for traffic Sept. 5. (May 27, p. 382.)

CANADIAN ROADS.—Galliher & Wilson of Nelson, B. C., give notice that application will be made to the Legislative Assembly of British Columbia at the next session for power to build a railroad from a point at or near Trail, to run east via Sayward to Salmon, and thence south down Salmon River to its junction with the Pend d'Oreille River.

CANTON, ABERDEEN & NASHVILLE.—The Secretary of State of Alabama has appointed John C. Welling, First Vice-President of the Illinois Central; James T. Hanrahan, Second Vice-President of the I. C., and G. D. Fitzhugh, Chief Engineer of the C., A. & N., as Commissioners to open books of subscription and stock in Marion, Fayette and Lamar counties for the new C., A. & N. RR., which is to be built from West Point, Miss., on the Aberdeen branch of the I. C., northeast 60 miles to Winfield, Ala. (Aug. 26, p. 618.)

CHICAGO, BURLINGTON & QUINCY.—This company has double tracked its line from Troy to McDill, Ia., and expects to complete the work from Woodburn to Osceola, Ia., by Oct. 15. John Foley & Co. are the contractors. (Official.)

CHICAGO, INDIANAPOLIS & LOUISVILLE.—This company is ballasting its tracks with gravel at different points along the line from Green Castle south 20 miles to Bedford, Ind. The total track to be ballasted is approximately 45 miles. The company is doing the work itself. (Official.)

CHIHUAHUA & PACIFIC.—A deal has been consummated by which this company has bought from the Nassau Construction Co. its contract to build the road through Chihuahua, Mex., west to Guerrero. The purchase includes the entire outfit of the contractors, and the company will continue the building of the road, assuming and continuing all the subcontracts made by the Nassau Construction Co.

CHOCTAW, OKLAHOMA & GULF.—For statement as to proposed extensions on this road, see Railroad News column.

EAST TENNESSEE & WESTERN NORTH CAROLINA.—C. H. Nimson, General Superintendent of this company, writes that a proposition has been under consideration some time by parties interested in several lines, of which his is one, for a system that would connect the Louisville & Nashville with Charleston, S. C. No action has as yet been taken, but it is only a question of time, he says, when the proposed line will be built. The plan includes a connecting link from the Louisville & Nashville and Klondike Junction with the South Atlantic & Ohio. Another link would carry the line to Bristol, Tenn., thence by the Bristol, Elizabethton & North Carolina to Elizabethton, Tenn. At this point the connection would be made with the East Tennessee & Western North Carolina to Cranberry, N. C. Another link would there join Cranberry with the Ohio River & Charleston, which runs to within 55 miles of Charleston, S. C.

ERIE.—In order to improve the alignment and grades in Goshen, N. Y., it is proposed to build a "cut-off" railroad, 2¾ miles in length, from a point on its main line about two miles west of the present depot, to a point about 1¼ miles east of said station. This new line will be located about one mile south of the present main tracks. There will be two bridges, 20 ft. in length, over streams; three, 40 ft. in length, over highways; two, 100 ft. long, under a highway and the Pine Island branch, and two 80 ft. under highways. There will be one cut 4,500 ft. in length with a maximum cutting of 55 ft., and one cut 1,000 ft. long, with maximum cutting of 25 ft. The embankment will have a maximum fill of 25 ft. There will be three overhead and three undergrade highway crossings. Contracts for the grading, etc., will be given out as soon as the necessary right of way has been secured. (Official.)

FRANKLIN, SOMERSET & KENNEBEC.—The section of eight miles from Farmington, Me., east to New Sharon the company hopes to have completed by the middle of October, and the entire line from Farmington southeast to Augusta by the fall of 1899. It is further proposed to extend this narrow gage road from Farmington north 25 miles to Attean, where connection will be made with the Canadian Pacific. L. Atwood of Farmington, Me., is President. (March 18, p. 208.)

GEORGIA PINE.—This company has asked for an amendment to its charter to extend its line from Arlington, Ga., north about 19 miles to Columbus. It has also made application in Florida to extend its line south to Tallahassee. (Apr. 8, p. 266.)

ILLINOIS CENTRAL.—The grades for 126 miles between Fulton and Memphis have been cut, according to report, to uniform incline of 26 ft.

INDIANA, ILLINOIS & IOWA.—Surveys are reported in progress for an extension of this line from Streator, Ill., west to some town, as yet undetermined, on the Mississippi River. Keithsburg is thought to be the place. The line runs from South Bend, Ind., to Streator, 150.75 miles.

IOWA CENTRAL.—Contracts are reported let to build three miles of railroad from Albia, Ia., to a neighboring coal mine.

MANISTIQUE & NORTHWESTERN.—This company is extending its line from Scotts, Mich., 28 miles from Manistique, north eight miles to Shingleton on the Duluth, South Shore & Atlantic. The contract for grading has been let to Swanston & Lick, Manistique, and about five miles is completed. Rails are purchased for the extension and about three miles of the track laid. This work is being done by the company's own force. The connection will probably be completed by November. The company is also making an extension northeast to the Munising RR. and grading on this line is done. The rails will be laid in a short time, to be completed by Oct. 1. The road now runs from Manistique north through Scotts to McNeils, 36 miles. Geo. H. Orr of Manistique is Vice President and General Manager. (Official.)

MEXICAN INDUSTRIAL.—The belt line of 9.5 km. (5.9 miles) around the City of Mexico is completed and trains began running Sept. 2. The plan includes a connecting line to San Nicholas, making a total length of 28.5 km. (17.6 miles). S. W. Reynolds of Mexico City is President. (June 24, p. 467.)

MIDLAND OF NOVA SCOTIA.—Rapid progress is reported in grading on the 40 miles of this line from Windsor, N. S., east to the Shubenacadie River, which it is hoped will be completed by Nov. 1. The bridge over the St. Croix River, a few miles out from Wind-

sor, is expected to be finished by the end of December. No rails will be laid this fall, but the intention is to begin track laying and ballasting as soon as the frost is out of the ground in the spring. The road is to be extended to Truro. 60 miles. (Sept. 19, p. 603.)

MOSCOW, CAMDEN & ST. AUGUSTINE.—Track is reported laid from Moscow, Tex., to the mills of W. T. Carter & Bro., who have nearly 6,000,000 feet of lumber ready for shipment. The line as projected is to run from Moscow northeast 50 miles through Tyler and Angelina counties to St. Augustine. W. T. Carter of Camden, Tex., is President. (July 8, p. 503.)

MUSQUODOBOIT VALLEY.—The preliminary survey made for this line from Windsor Junction east about 40 miles, through the Musquodoboit Valley to Parker's Corners has not proved satisfactory, as it has been found that part of the line will be very expensive and locally unremunerative. Another survey will be made by the shore route, where an old survey shows that the road may be more easily built. (June 10, p. 421.)

NEW ROADS.—Surveys are reported in progress for a line from Perris, Cal., to Lakeview, and work is to begin at once. It is stated that the Santa Fe is back of the project.

I. L. Shank is reported to have about completed a $10,000 tram road on his lumber tract north of Enterprise, Pa.

PHILADELPHIA, READING & NEW ENGLAND.—The Reorganization Committee has obtained options on 62 pieces of land in Connecticut, and on 30 pieces of land in Massachusetts, for the proposed extension from Tariffville, Conn., to Springfield, Mass. It is estimated that the right of way will cost about $35,000. The route is surveyed as far as Agawam, but building will not begin before October, when it is expected that the main line will be bid in by the Reorganization Committee.

RESTIGOUCHE & WESTERN.—The town of Campbelltown, N. B., has voted a bonus of $5,000 for this line, now building from Cempbelltown to the St. John River. Malcolm & Ross of St. Leonard's, B. C., have the contract. (Sept. 9, p. 656.)

ST. JOSEPH & GRAND ISLAND.—The North R. R. Co. of Kansas City was incorporated in Missouri Sept. 2, with a capital stock of $125,000, to build the proposed cut-off from Gower to Trimble, Mo., about 11 miles. The St. Joseph & Grand Island recently made arrangements with the Atchison, Topeka & Santa Fe, and the Kansas City & Northern Connecting, to obtain trackage rights into Kansas City, and this cut-off will provide a more direct route for the trains which now run via Plattsburgh. Among the stockholders are Robert Gillhan, Chief Engineer of the Kansas City & Northern Connecting, Kansas City, Mo.; C. A. Braley, J. T. Nolthenius, F. B. Wilcox and B. M. Simpson. (July 22, p. 539.)

SAN FRANCISCO & SAN JOAQUIN VALLEY.—Persistent rumors appear in California that this road is to be extended from its southern terminus at Bakersfield, Cal., south to the nearest point on the Santa Fe, either Mojave or Rogers. Vice-President Robert Watt, of the S. F. & S. J. V., is reported to have stated that the Santa Fe will have no hand in the building, but that a new company will be formed, which will soon make a survey. The road will probably run through Tejon Pass, south about 82 miles to Rogers, and the estimated cost is placed at between $5,000,000 and $6,000,000. This route would require a tunnel about 8,000 ft. long. J. W. Helman, President of the Union Trust Co., and of the Nevada Bank at San Francisco, who, with his associates bought a large block of S. F. & S. J. V. stock, is reported to be one of the men interested in the new company. The plan further includes a connection with the new Utah & Pacific road, which is now building toward the Nevada state line. To prevent ruinous speculation in the stock of the S. F. & S. J. V., one-half of the outstanding stock has been turned over to the Union Trust Co. under an agreement to pay for the shares at par on Jan. 1 next, or to return the stock to the owners.

It has not yet been decided when track laying is to begin on the extension from Stockton toward San Francisco. In addition to the big 5,700 ft. tunnel, there are to be four smaller tunnels, two to the east and two to the west of the large tunnel. These are to be 800 ft., 1,300 ft., 350 ft. and 900 ft. respectively. Cotton Bros. of Oakland, Cal., have begun building one and one-half miles of bridge and trestle on the Tule Lands west of Stockton, between Middle and Old rivers. They will use about 3,000 piles on the remaining five and one-half miles of the Tules. The roadbed will consist of an embankment 12 ft. high and 160 ft. wide at the base and 20 ft. at the top. This embankment and trestle with the tunnels will require about 18 months to finish. (Sept. 2, p. 639.)

SOUTHERN.—This company proposes to build two connecting links for a short line between Danville, Va., and Charlotte, N. C. One link will be from Reidsville southwest about 30 miles, and the other from Mooresville, the terminus of the new line, from Mocksville, to run southwest about 20 miles to Gastonia. This will shorten the distance some 50 miles.

According to reports, another survey is being made for the proposed extension from Stevenson, Ala., northeast to Chattanooga, Tenn. It is hoped that the distance, which under the old survey was 55 miles, can be reduced by 10 miles. (June 17, p. 445.)

SOUTHERN PACIFIC.—Grading is completed and the track nearly laid on the extension of the Visalia Branch from Visalia, Cal., southeast 9.436 miles to Exeter. (July 8, p. 503.) Grant Bros. of San Francisco have the contract. The trestles over waterways are nearly completed by John McCarthy, Oakland, Cal. (Official.)

Surveys are made according to report for a branch from a point 25 miles west of Birmingham, Ala., to run north 40 miles along Horse Creek, to the mines of the Ivy Leaf Coal & Coke Company in Walker County. It will be used only for freight.

This company is reported to be making surveys for an extension from San Pedro, Cal., to Redondo, 15 miles.

TERMINAL RAILWAY OF BUFFALO.—Track is laid 10½ miles, connecting the Lake Shore & Michigan Southern at Blasdell, N. Y., with the New York Central & Hudson River at Depew, and trains were to begin running Sept. 15. The line will be used at present for freight only, doing away with much unnecessary switching at East Buffalo. (Apr. 8, p. 266.)

UNION PACIFIC.—Surveys are being made for an improvement in the location between Cheyenne and Laramie, Wyo., to avoid Dale Creek bridge and Sherman Summit, and to secure easier grades. Surveying parties are also in the field making a re-location of the main line between Laramie, Wyo., and Fort Steele, whereby Lookout Summit may be cut out, the grades much reduced and the line considerably shortened. (Official).

Electric Railroad Construction.

CARTERET, N. J.—The Carteret Electric Light & Power Co. is reported incorporated to operate electric light and power plants and a street railroad; capital stock, $20,000 The incorporators are: John A. Quinn, Jr., Carteret; Wm. J. Landsley, Elizabeth, and Walter K. Whitaker, Sewaren.

CHICAGO, ILL.—A permit was issued by the Street Department Sept. 1 to the Chicago General Ry. to build a triangular loop in Twenty-second street, West Fortieth avenue and Ogden avenue, to be used by the Ogden avenue line of the West Chicago Street Ry. and the Riverside line of the Cicero & Proviso Co. These companies have bought the triangular piece of ground inside this loop, on which it is said a pavilion will be built next spring.

COPLAY, PA.—The Coplay, Egypt & Ironton St. Ry. Co., it is stated, has completed surveys and secured rights of way for the trolley road to connect Coplay and Ironton. The road will be about six miles long. H. Y. Horn is President. (June 3, p. 400.)

DETROIT, MICH.—The Detroit, Lake Shore & Mt. Clemens Ry. was opened recently and cars are running regularly. (June 24, p. 467.)

EAST ST. LOUIS, ILL.—The Mississippi Valley Ry. Co., of St. Louis, Mo., has applied for franchises from the Board of Supervisors of Madison County, Ill., to operate electric cars in Collinsville, Edwardsville and East St. Louis. (Aug. 26, p. 619.)

FITCHBURG, MASS.—The Fitchburg & Ashby Ry. Co. is reported organized to build an electric railroad. Among those interested are Francis W. Wright, E. A. Hubbard, Albert M. Wilder, Harry F. Bingham and Alonzo A. Carr.

HARTFORD, CONN.—Mr. George W. Dunham of Flemington, N. J., writes us in regard to the interurban electric line between Hartford, Conn., and Springfield, Mass.:

I recently purchased the controlling interest of the Springfield & Southwestern, the Windsor Locks Tramway Co., the East Granby & Suffield Ry. Co. and the East Windsor Electric Co. These four roads are in existence under special charters from the Connecticut Legislature. I am also interested in the proposed Springfield & Agawam Ry. Co., a corporation in process of organization under the laws of Massachusetts. All the above named companies, except the East Windsor Electric Co., are being consolidated under the East Granby charter, and will be known as the Hartford & Springfield Ry. Co. The road will extend from West Springfield, Mass., where it connects with the street railroads of Springfield and Holyoke, through the city of West Springfield and the town of Agawam, Mass., across the state line into Connecticut, and through the town of Suffield and Windsor Locks to Rainbow, where it connects with the Hartford Street Ry., thereby making a through electric road between Hartford and Springfield, a distance of about 24 miles. The power house is located about the middle of the line. Water power will be used almost entirely, although a steam plant will be used in reserve. The grading on the entire line is nearly completed, and about six miles of ties are laid; on this work about $60,000 has already been expended. We are building the road with a single track, with 300 ft. turnouts at every 4,500 ft. Chestnut and oak ties are used, 2,000 to the mile; there are no grades in excess of 5 per cent. and no sharp turns, so that we can run cars at a good speed. The rails will be 60-lb. T rails. Iron poles with brackets will be used in the city and wooden poles in the highway. The road follows the public thoroughfare along its entire route except for about one and one-half miles, where it will be built on its own right of way. The population of the smaller towns through which the road passes is about 12,000, and the population of Hartford and Springfield is about 150,000, while the population tributary to these two centers of trade is estimated at 300,000. We propose to run a through car every 30 minutes, and charge 25 cents for the through trip, of which 5 cents will go to the Hartford Street Ry. and 5 cents to the Springfield Street Ry. and 15 cents to the Interurban. The steam railroad fare is 50 cents, and the service is quite infrequent, while on Sundays there are no local trains. Upon the completion of this line one will be able to ride on electric cars from Mt. Tom, near Holyoke, Mass., to the various towns south of Hartford, a distance of over 60 miles, for 25 cents.

LAWRENCE, KAN.—The Lawrence Ry. Co. has been chartered with a capital stock of $250,000, to build about 10 miles of electric road in Lawrence. The company's charter gives it the right to do a freight and passenger business. The Directors are: R. W. Luddington, T. J. Sweeney and S. P. Moore of Lawrence; Charles W. Kincaid, Wm. S. Hooper and Frank Kern of Matoon, Ill., and Wm. D. Ewing of Boston. (Aug. 19, Sept. 9, pp. 604, 657.)

NEW YORK, N. Y.—The Metropolitan St. Ry. Co. on Sept. 9 began changing the motive power on the Broadway cable line to electricity. It was originally intended not to make the change before next year. Ground was first broken at Bowling Green. The work will be done on two or three blocks at a time and in the very crowded parts of Broadway will be continued only at night.

SAGINAW, MICH.—Concerning the plans of the Saginaw & Frankenmuth Ry. for building an electric road, we are informed that work will not be begun on the road until spring. James B. Peter, President. (Sept. 2, p. 639.)

Mr. A. H. Swarthout, of the Saginaw Suburban RR. Co., informs us that a contract has been made with the National Engineering Bureau for building and equipping the road by January, 1899, and work is begun. The company has bought the right of way of the Rapid Transit Co. between Saginaw and West Bay City, which is now graded and bridged. The route of the Saginaw Suburban will be from Bay City to Flint (about 52 miles), via West Bay City, Saginaw, Frankenmuth, Clio, Penn Run and Mt. Morris.

ST. LOUIS, MO.—The Lindell Ry. Co. has completed arrangements for four important extensions in St. Louis County, as follows: From the Forest Park Highlands line to Clayton; from the junction of the Forest Park and Clayton line south to Maplewood, Shadyside and Webster; two branch lines to Creve Cœur Lake and a branch line from the Clayton extension southwesterly to Kirkwood and Meramec Highlands.

UTICA, N. Y.—The Utica Suburban Ry. Co., operated under lease by the Utica Belt Line St. RR. Co., has applied to the authorities of New Hartford for permission to lay tracks for its proposed branch line to connect New York Mills, Capron and New Hartford.

WEST SUPERIOR, WIS.—The Superior Rapid Transit Ry. Co. will build a second track from the Interstate Bridge to the West Superior Hotel, thus uniting the street railroad systems of Duluth and Superior.

WORCESTER, MASS.—The new electric road from Grafton to Worcester, about seven miles long, via North Grafton and Millbury Junction, is expected to be in operation by Nov. 1. Work was begun on the line Sept. 1.

The Worcester & Clinton St. Ry. Co. has completed its electric road, except for a short distance on a part of the route where the state is building a new highway. This trolley road will be about 12 miles long. A. S. Paton, Leominster, Mass., is President of the company.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the date named:

June. 30.		1898.	1897.	Inc. or Dec.
Buffalo, Rochester & Pittsburgh.				
12 months.....	Gross	$3,550,909	$3,213,362	I. $337,547
12 "	Net	1,281,711	1,024,147	I. 257,564
Central of Georgia.				
12 months.....	Gross	$5,507,069	$5,280,695	I. $226,374
12 "	Net	1,897,161	1,828,134	I. 69,027
Cleveland, Cincinnati, Chicago & St. Louis.				
12 months.....	Gross	$14,018,290	$12,832,515	I. $1,185,775
12 "	Net	3,049,923	2,967,850	I. 81,073
Delaware & Hudson System.				
12 months.....	Gross	$7,511,744	$7,027,685	I. $304,059
12 "	Net	2,902,034	2,735,651	I. 166,383
Lehigh Valley Lines in New York.				
3 months.....	Gross	$1,225,489	$1,209,464	I. $16,025
3 "	Net	28,797	113,367	D. 84,570
12 months.....	Gross	5,746,268	.....	.....
12 "	Net	2,053,315	.....	.....
Lehigh Valley.				
12 months.....	Gross	$19,854,274	$19,258,576	I. $595,698
12 "	Net	5,958,370	5,212,133	I. 746,237
New York Central & Hudson River.				
12 months.....	Gross	$45,773,520	$43,614,404	I. $2,159,116
12 "	Net	16,262,506	16,014,493	I. 248,013
Norfolk & Western.				
12 months.....	Gross	$11,236,123	$10,537,722	I. $698,400
12 "	Net	3,350,024	2,634,272	I. 715,752

July 31.		1898.	1897.	Inc. or Dec.
Central of Georgia.				
1 month.....	Gross	$449,625	$359,149	I. $90,476
1 "	Net	148 612	89,236	I. 59,376
Chicago, Rock Island & Pacific.				
1 month.....	Gross	$1,786,577	$1,661,773	I. $124,804
1 "	Net	602,288	654,338	D. 52,050
4 months.....	Gross	6,631,149	5,586,428	I. 1,044,721
4 "	Net	1,987,310	1,678,636	I. 308,674
Illinois Central.				
1 month.....	Gross	$2,052,074	$1,984,075	I. $67,999
1 "	Net	465,607	476,120	D. 10,513
Mexican International.*				
1 month.....	Gross	$268,010	$240,045	I. $27,965
1 "	Net	108,899	94,310	I. 14,589
7 months.....	Gross	1,933,983	1,782,811	I. 151,172
7 "	Net	746,607	683,085	I. 63,522
*Mexican currency.				
Oregon Short Line.				
1 month.....	Gross	$565,673	$559,342	I. $6,331
1 "	Net	270,525	254,625	I. 15,900
Philadelphia, Wilmington & Baltimore.				
1 month.....	Gross	$862,078	$748,978	I. $113,100
1 "	Net	312,934	225,734	I. 87,200
9 months.....	Gross	7,028,132	6,399,032	I. 629,100
9 "	Net	1,893,694	1,616,494	I. 277,200
Southern Pacific.				
1 month.....	Gross	$4,466,568	$4,522,208	D. $55,640
1 "	Net	1,586,910	1,813,727	D. 226,817
West Jersey & Seashore.				
1 month.....	Gross	$359,873	$334,173	I. $25,700
1 "	Net	137,950	114,950	I. 23,000
7 months.....	Gross	1,418,602	1,361,302	I. 57,300
7 "	Net	315,980	290,080	I. 25,900

Aug. 31.		1898.	1897.	Inc. or Dec.
Great Northern System.				
1 month.....	Gross	$1,940,760	$1,777,585	I. $163,175
2 months.....	Gross	3,729,772	3,556,406	I. 173,366
New York Central & Hudson River.				
1 month.....	Gross	$3978,837	$4,246,879	D. $268,042

AUGUSTA SOUTHERN.—Judge Calloway, at Augusta, Ga., has made permanent the receivership of this road, appointing James U. Jackson, President of the A. S., and J. H. Sands, General Manager of the South Carolina & Georgia, co-receivers. As stated before, this action is by the officers of the A. S. to break the lease with the S. C. & G. (Aug. 5, p. 572.)

AVOYELLES.—This company has been incorporated in Louisiana, with a capital stock of $150,000, as successor to the St. Louis, Avoyelles & Southwestern, which was sold at auction Aug. 20 to Emile Cahlbach for $110,000. The incorporators are Theo. Seligman, Albert Straus, Chas. P. Cocke and Loys Charbonnet of New Orleans, La.; and Nathan G. Pearsall and W. H. Peterman of Marksville, La. The line runs from Bunkie, La., to Simmesport, 26 miles, with a branch from the main line to Marksville, 10 miles. (Sept. 2, p. 640.)

CHOCTAW & MEMPHIS.—This company has been organized to succeed the Little Rock & Memphis, after the foreclosure sale of Oct. 25 next. Edward B. Smith & Co. of Philadelphia have bought $2,100,000 bonds of the new company, which will form a part of the issue of $3,400,000 5 per cent. bonds. The proceeds will be used to buy the Little Rock & Memphis, and to extend the road from Little Rock west about 130 miles to the Indian Territory line. Arrangements have been made whereby the

Choctaw, Oklahoma & Gulf is to acquire the C. & M., and will extend its own line from Howe Junction, Ind. Ter., on the Kansas City, Pittsburgh & Gulf, to the state line, 13 miles, to connect with the proposed extension of the C., & M. The C., O. & G. extends from Bridgeport, Okla., west 247.6 miles to Howe Junction, and is building an extension west from Bridgeport to Weatherford, which will be opened Oct. 1. The extension from Wister to Howe Junction, 6½ miles, was opened for traffic last month. The Little Rock & Memphis runs from Little Rock, Ark., east 135 miles to Memphis, Tenn. It went into the hands of a receiver June 1, 1893. (L. R. & M., p. 722.)

CRYSTAL RIVER.—This road has been sold at public auction in Colorado under order of the Federal Court, and it has been reincorporated in that state with a capital stock of $1,000,000 to make the proposed extensions. Among the incorporators are Judge D. C. Beaman and J. A. Kebler of Denver, Colo. The road was incorporated several years ago, but work was suspended on account of the panic of 1893. (Aug. 26, p. 618.)

DETROIT & LIMA NORTHERN.—Judge Harmon of the United States Court at Toledo, O., Sept. 6, on application of Joshua Harmon of New York City, appointed James B. Townsend of Lima, O., Receiver of the D. & L. N., and Irving Belford Special Master, to report on the condition of the road. Mr. Harmon is a contractor who makes claims against the company to the amount of about $20,000 for work performed. In view of this receivership, a committee consisting of Walter G. Oakman, chairman, New York; John I. Waterbury, New York; E. A. Merrill, Minneapolis, Minn.; Jules S. Bache, New York, and Philip Lehman, New York, has been requested by the bondholders owning or representing a majority of the stock, to act as a committee in their behalf. Bondholders are asked to send their names and addresses to H. A. Murray, Secretary, 65 Cedar street, New York.

GALESBURG & GREAT EASTERN.—This company was incorporated in Illinois Sept. 6, with a capital stock of $250,000, as successor to the Galesburg, Etherly & Eastern. The old company was incorporated in 1894, and has completed its line from Galesburg, Ill., east 10 miles to Etherly, but the operating company failed and the property was bought by Henry Harms, who built it. Mr. Harms is among the incorporators of the new company. (Apr. 13, 1894, p. 277.)

GALVESTON, LA PORTE & HOUSTON.—Judge D. E. Bryant of the Eastern District of Texas has refused to confirm the sale of this road made on July 6, to Geo. C. Holt of Woodstock, Conn., for $400,000, and the road is to be re-advertised for sale Oct. 4. L. J. Smith, who opposed confirmation of the sale, was required to furnish a bond of $50,000, guaranteeing a purchaser who would pay more than $425,000 at the time of the sale. (July 22, p. 539; Aug. 19, p. 604.)

KANSAS MIDLAND.—The St. Louis & San Francisco took possession of this road Sept. 2, under contract recently made with the receiver. (Aug. 26, p. 620.)

LOUISVILLE & NASHVILLE.—This company on Sept. 2 paid off the $300,000 mortgage on the Southern Division of the Cumberland & Ohio, known as the Greensburg Branch, at the Treasurer's office in Louisville.

NORTHERN PACIFIC.—The Board of Directors have set aside $3,000,000 out of the surplus income as a reserve available as may be found necessary, until the end of 1901, toward maintaining the regular quarterly dividends on the (non-cumulative) preferred stock. This is simply a prudential step. The preliminary statement of the company's income for the year ended June 30, shows a surplus of $2,897,874 above the amount needed for the 4 per cent. dividend on the $75,000,000 of preferred stock.

NORTHERN PACIFIC TERMINAL.—Holders of bonds of this company are notified that 19 have been drawn for the sinking fund, to be paid by the Farmers' Loan & Trust Co., New York, Oct. 1, at 110 and accrued interest.

PANAMA.—The holders of 6 per cent. sinking fund subsidy bonds are notified that 121 of these have been drawn for payment for the sinking fund, at the office of the Treasurer, New York, from Sept. 6.

PANHANDLE.—Special Master Thomas P. Martin of Fort Worth, Tex., sold this road at public auction at Washburn, Tex., for $66,240, to E. Wilder of Topeka, Kan., Secretary and Treasurer of the Atchison, Topeka & Santa Fe. The Panhandle runs from Panhandle, Tex., to Washburn, 16 miles, and was controlled by the Fort Worth & Denver City for some years, until arrangements were made in June by the A., T. & S. Fe to obtain control of the road. A receiver was appointed Oct. 13, 1893. (June 24, p. 468.)

PENNSYLVANIA COMPANY.—Holders of Toledo, Walhonding Valley & Ohio first mortgage bonds are notified that the Farmers' Loan & Trust Co. of New York will accept sealed proposals for the same up to Oct. 1, for an amount at par and interest not to exceed $24,780.

PEORIA & EASTERN—(Cleveland, Cincinnati, Chicago & St. Louis.—The P. & E. has arranged for the extension of preferred bonds of the Indiana, Bloomington & Western, maturing Jan. 1, 1900, to April 1, 1940, with interest from Oct. 1 next at 4 per cent., payable April 1 and Oct. 1 each year. Bondholders may present their bonds at the Central Trust Co., New York, at any time after Oct. 1, to receive this extension. Coupons maturing on and after Jan. 1, 1899, will be detached and canceled, the holders receiving the cash payment equal to the face value, with interest at 7 per cent., from July 1, 1898, to Oct. 1, 1898; and at 3 per cent. from Oct. 1, 1898, to Jan. 1, 1900. The Central Trust Co. will buy the bonds of those who do not wish to extend them at par, with interest at 7 per cent. from July 1 to Oct. 1, 1898, and at 3 per cent. from that date to Jan. 1, 1900.

PHILADELPHIA & READING.—Holders of P. & R. Coal & Iron Co. loan of Jan. 30, 1883, for $432,000, are notified that $20,000 of these bonds have been called for payment Oct. 1, at the office of the Fidelity Insurance Trust & Safe Deposit Co., Philadelphia.

RICHMOND, NICHOLASVILLE, IRVINE & BEATTYVILLE.—At a meeting of the stockholders Sept. 3, Bennett H. Young, T. W. Bullitt, Vernon D. Price, W. W. Hill and W. J. Thomas were appointed a committee to represent their interests in the sale of Oct. 6. (Sept. 9, p. 657.)

ST. LOUIS, KANSAS & SOUTHWESTERN.—Hiram P. Dillon, Master Commissioner, gives notice that this road will be sold at public auction at noon, Oct. 22, at the station house of the company at Colwell, Kan. A decree of sale was made Sept. 23, 1897. The line runs from Kansas City, Kan., to Anthony, 59.35 miles. A receiver was appointed Nov. 28, 1896. (April 29, p. 318.)

ST. LOUIS SOUTHWESTERN.—Attorney General Crane has filed a suit in the District Court of Smith County, Tex., praying for a forfeiture of the charter of this company, and asking for the appointment of a receiver and for a penalty of $5,000 a day from Jan. 1, 1897, to Aug. 31, 1898, for failure to keep its general offices in Tyler, Tex., as the law directs.

UNION PACIFIC.—It is announced that the receivership of the Union Pacific, Denver & Gulf, and the Denver, Leadville & Gunnison will end Dec. 31 next. The sale of the D., L. & G., under the foreclosure has been postponed to Nov. 11, and the U. P., D. & G. will be sold about the same time. (U. P., D. & G., April 22, p. 302; D., L. & G., Aug. 26, p. 620.)

UNION PACIFIC, CENTRAL BRANCH.—Hiram P. Dillon, Special Master, gives notice to holders of first mortgage bonds of the Atchison, Jewel County & Western, dated Dec. 1, 1879, and to holders of first mortgage bonds of the Atchison, Colorado & Pacific, dated Dec. 24, 1879, that he is prepared to pay a proportionate amount due upon said bonds and coupons on account of the foreclosure sale of these roads by decree of the court. Holders failing to present the same at his office in Topeka on or before Sept. 24, shall not be entitled to any interest in the proceeds of the sale after that date. (July 22, p. 540.)

WHEELING & LAKE ERIE.—Brown Bros. & Co. of New York give notice to holders of their certificates of deposit for W. & L. E. extension and improvement 5 per cent. gold bonds, that upon presentation of the same for indorsement, the holders will receive payment of the coupon due Aug. 1, 1897, with interest at 6 per cent., to Sept. 6, 1890. The coupons of Feb. 1 and Aug. 1, 1897, were purchased by Brown Bros. & Co. under the bondholders' agreement of Feb. 1, 1897. (Sept. 9, p. 657.)

Electric Railroad News.

BOSTON, Mass.—The Boston Transit Commission has ordered the removal of all surface tracks on Tremont street from Boylston St. to Scollay Square, and on Boylston street from Park Square to Tremont street. The work is to be done immediately. It was to relieve the congestion on these streets that the Subway was built. The officials of the Boston Elevated have had under consideration for some time plans for disposing of the traffic on various lines now running on Tremont street. The Columbus avenue lines will be diverted through Berkeley street to run to the Northern station and beyond through the Subway. The East Boston and Chelsea lines will be run down Hanover street as usual, in preference to the proposed detour through the Subway to the Northern station, and then via Causeway street and Atlantic avenue. To connect with the uptown lines these cars will be diverted to Washington street at some point in the Dover street district. The engineers of the road are at present designing such a connecting route.

MONTREAL, QUE.—The Montreal Park & Island Railway will be sold by the Sheriff on Sept. 22, as per notice in the Quebec Official Gazette.

NEWARK, N. J.—The $1,500,000 of 5 per cent. bonds of the Newark & South Orange Ry. Co. have been called for payment at par, and will be replaced by 4 per cent. bonds of the North Jersey St. Ry. Co.

PETERSBURG, VA.—In the Corporation Court of this city, on Sept. 6, Judge Mullen ordered a decree to be entered in the suit of Upper Appomattox County vs. Petersburg Electric Ry. Co., and the Farmers' Loan and Trust Co. of New York vs. Petersburg Electric Ry. Co., ordering the sale of this road Nov. 10, at Petersburg. The proceeds of the sale will be used toward paying off the liens which have been secured against the company and the bonds, the latter amounting to about $50,000, and secured by deed of trust upon the property. The road has three miles of track.

WHEELING, W. VA.—A special meeting of the stockholders of the Wheeling Ry. Co. will be held Oct. 1, to vote on the question of increasing the capital stock and issuing bonds to improve and extend the lines. It is stated that the Wheeling Co. recently acquired control of the Bellaire, Bridgeport & Martin's Ferry St. Ry. of Bridgeport, O., and is about to acquire the Moundsville, Benwood & Wheeling Ry.

TRAFFIC.

Traffic Notes.

On. Aug. 30 the number of cars of cattle passing through St. Paul for Chicago was 400, the largest run on record.

The California limited express of the Atchison, Topeka & Santa Fe between Chicago and Los Angeles will begin running Nov. 2 and will run three times a week each way.

The Intercolonial Railroad, which, under a contract of long standing, has hitherto delivered most of its westbound freight from Nova Scotia to the Canadian Pacific at St. John, N. B., has notified the Canadian Pacific that it does not wish to renew the contract; and such freight is hereafter to be taken through over the Intercolonial to Montreal, where the Grand Trunk will have a chance to get a share of it.

On Oct. 1 a Manchester (Eng.) firm will begin running steamships between that port and Boston. It is said that contracts have been made to carry cotton which is brought to Boston by the Fitchburg Railroad. A train of 39 carloads of cotton arrived at Boston Sept. 6, making a full cargo for the steamship New England. In the year 1897 96,000 bales of cotton were carried to Boston by the Fitchburg and during the same period 72,000 bales were delivered there by the Baltimore boat line.

Newspaper reporters at Minneapolis seem to think that the pool of the flour traffic recently made by the boat lines on the lakes is very effective. It will be remembered that the railroads leading from Minneapolis to the lake ports were reported to have also made a pool. The traffic officers of the railroads are now said to be exceedingly reticent whenever they are questioned about the subject, which is inferred to mean that they have actually made some secret agreement concerning the division of the traffic. But, however this may be, the reporters say that the flour rates are now strictly maintained by all of the roads.

The New York Central has reduced single one way and round trip fares between various towns in Western New York to compete with electric lines. Between Buffalo and Niagara Falls, 22 miles, the single fare is 40 cents, round trip 50 cents; Buffalo and Lockport, 26 miles, 50 cents and 75; on Saturdays and Sundays the round trip rate will be 50 cents instead of 75. Similar reductions are made to and from Tonawanda and Lewiston. Most of the new rates are about the same as those of the electric lines, though in some cases they are a little less. The time by the Central is in all cases considerably quicker. A later report states that the Erie and the Lehigh Valley have made reductions to match those of the Central.

Milling-in-Transit Rates.

The Interstate Commerce Commission, in an opinion by Chairman Knapp, has announced its decision of the case of the Listman Mill Company against the Chicago, Milwaukee & St. Paul. The opinion states that defendant's charges on grain originating at points on its Southern Minnesota Division, milled in transit at Lacrosse, Wis., and forwarded as product to Milwaukee or Chicago, are not more than 2½ cents per 100 lbs. in excess of its wheat rates from the same points of origin to Milwaukee or Chicago, and such milling rates as related to wheat rates, or as affecting the competitive relations of complaint with millers at Milwaukee, are not unjust or otherwise unlawful. The complaint is dismissed without prejudice.

Prices for Transportation of Troops.

Bids from various railroad companies received by the Quartermaster's Department, New York City, last week for the transportation of troops were as follows: For the Eighth Ohio from Long Island City to Columbus, O., West Shore, $5 for officers and men, with a rate of $3.50 per berth for sleeping car accommodations (for sick men.) All baggage and horses were included in that rate. The New York Central asked the same rate, but wanted $137.68 a car for baggage and horses. The Pennsylvania asked $5.75 for each man, and the Baltimore & Ohio, $6.

For the Second Wisconsin, to Camp Douglas, Wis., the West Shore asked $7.26, the New York Central $7, the Erie $6.98, the Baltimore & Ohio $11.89, and the Pennsylvania $11.39 for officers and men.

For the Sixth Illinois Infantry to Springfield, Ill., the West Shore bid $5.17, the Baltimore & Ohio $10.09, the Pennsylvania $10, the Chesapeake & Ohio $12, and the New York Central $5.

Chicago Traffic Matters.

Chicago, Sept. 14, 1898.

There is considerable grumbling among local freight officers of the eastbound lines over rates. Nobody seems to have any definite hope that traffic can be successfully divided among the various competitors, and yet the alleged claims of this road and that to some definite share of the shipments constitute a principal staple of the agents' conversation. Several of the roads are way ahead of the percentages they are supposed to be entitled to and, apparently, there is no inclination to even up matters. The Erie is 15,000 tons ahead, while the Lake Shore has been doing, comparatively, a light business. There is no doubt that concessions are being made in rates. The cuts are being made for the most part on the big shipments from the stock yards, dressed meat and live stock.

The lines running into the Union Stock Yards here practically have agreed to ignore the ruling of the Interstate Commerce Commission on the stock yards terminal charge. Since the decision was given out the railroads have made no change in this charge and they do not intend to unless they are beaten in a Federal court. The Illinois State Railroad and Warehouse Commission recently ruled in favor of the railroads in this matter.

Some time ago a report that the Lake Michigan Car Ferry Company would go out of business at the end of the present season gained currency. President Fisher of the company says that the ferry boats will not only continue to run between South Chicago and the north next season, but that arrangements are being made to largely increase the service.

The Eastern roads are running excursions from country points into Chicago nearly every Sunday. It is said that these excursions are being so distributed as to allow the differential lines to catch up in what they allege is a shortage of business, compared with their competitors.

General passenger agents of the Western roads are greatly pleased over the action of the Canadian Pacific in agreeing to abolish its differentials, and all believe they see an end to the ruinous rate wars that have been carried on between the Canadian Pacific and the lines of this country for years.

It has been agreed that the special low fares between Chicago and Missouri River points shall be abandoned Sept. 25; though it is yet possible that the date may be changed owing to the attitude of the Chicago & Alton, which now announces that it will not withdraw its low rates between here and Kansas City until the Omaha Exposition rates are canceled. As the latter rates will not be withdrawn until the close of the fair, Oct. 31, it is quite probable that the present rates in effect between this city and St. Paul will remain in effect until the latter date.

In a party of 53 members of the Grand Army of the Republic, which passed through Chicago last week on their way to the National Encampment at Cincinnati, it is said that no less than 23 were riding on passes, these passes being the consideration which the railroad gave to get the other 30 passengers; and the 30 were, of course, carried at half price.

The movement of grain from Kansas and Nebraska to the Gulf of Mexico for export to Europe is again said to be heavy. The Atchison, Topeka & Santa Fe carries corn and wheat from principal Kansas points to Galveston at 12 cents per 100 lbs. As the rate from Kansas City to the Atlantic seaboard is 32½, it looks as though the eastbound lines would not get much of the traffic.